The

Electrical Review

VOL. CVII. AUGUST 8, 1930. No. 2750.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

Chairman and Joint Managing Director: G. H. ALABASTER, COMPANION I.E.E.

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Telegraphic Address: "AGEEKAY, CENT, LONDON." Code, A B C. Telephone No.: Central 5871 (5 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades, and has by far the Largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d.; Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders on Chief Office, London) to be made payable to THE ELECTRICAL REVIEW, LIMITED, and crossed "Midland Bank, Newgate Street Branch."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

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Consumers and Change-overs.

THE obligations of an electricity undertaking towards its consumers in respect of plant rendered unsuitable by changes in supply conditions have recently been much debated and we have received many inquiries relating thereto.

Such changes may be of frequency, voltage, or system (d.c. to a.c.), but in each case the obligations are threefold and must take into account (1) plant installed prior to the notice of changeover and duly reported to the supply authority; (2) plant so installed, but not reported by the consumer; (3) plant installed between the notice and the date of changeover.

The legal position is somewhat obscure, as will be evident from the article on another page by Mr. J. W. THOMAS, who is able to consider the position from the different aspects of engineer and barrister-at-law.

From this article it will appear that the terms of the consent given by the Electricity Commissioners to a changeover provide the key to the situation.

It will not be amiss, however, to consider the moral obligations of an undertaking. No one will doubt that, as regards the first group at any rate, an undertaking in changing over its system should leave its consumers no worse off than they were before.

The query raised by "Wyvern" in our correspondence columns of May 9th may be considered under this heading. The point at issue was the responsibility of a supply authority for making an a.c. installation as safe as the d.c. installation formerly was. The test here would seem to be whether any alterations made were necessary to enable the a.c. installation to comply with the I.E.E. Wiring Regulations, assuming that the d.c. installation was of the same standard.

The case of plant installed before the notice, but not advised, appears at first glance more difficult, as most agreements provide that the consumer shall not add to his installation without notice to the undertaking. The justification for this proviso has always seemed to us to be in the protection it affords against a demand in excess of the service capacity, including meter and main fuses;

its intention is not to interfere with the right of the consumer to make minor additions that make no appreciable increase in the demand.

In practice, of course, consumers install such apparatus as vacuum cleaners and radio battery eliminators without reference to the supply authority. It is, however, these unknown connections that cause the cost of changeovers to be so often under-estimated and, incidentally, to nullify the value of returns of connections on domestic consumers' premises.

It would appear, therefore, that the duty of the undertaking in this case is again to compensate the consumer to the full extent of his installation. The real difficulty comes when the consumer installs plant after the publication of the intention of the authority to change the supply conditions. If the work could be carried out within a few days of the official notice, it would not be unreasonable to require the consumer to install no new apparatus in the interim. It is, however, inevitable that some time should elapse between the two dates, perhaps as much as six months with large systems, and the question naturally arises as to the fairness of requiring a consumer to forego the use of apparatus needed either for his comfort or his business for any appreciable period. We think, however, that such cases will form no large proportion of the total number and that difficulties should be capable of adjustment by negotiation.

We have in this article stressed the obligations of undertakings from the aspect of reasonable business-like relations with its consumers. Business relations must be based upon the law, of which a working knowledge, such as that conveyed by our contributor, is essential, but such relations will be the more satisfactory the less the law obtrudes itself. Undertakings benefit ultimately from changeovers and can therefore afford to interpret their obligations generously, particularly towards their older consumers whose support has probably made the change-over to modern systems desirable.

Tariffs.

The report of the Committee on Uniformity of Electricity Charges and Tariffs appointed by the Electricity Commissioners contains information of particular value and the publication of its report (which was briefly summarised last week and is outlined further elsewhere in this issue) without delay is welcomed accordingly.

The Committee studied forms of tariffs, not amounts to be charged, and there will be general sympathy with its regret that too many supply authorities have hitherto neglected to give effect to the succession of strong recommendations which have emanated from various committees, the technical Press, and the Commissioners themselves in favour of the offer of a multi-part tariff; it cannot be denied that those who ignore such advice are seriously prejudicing development.

More particularly concerned with general domestic supplies, the Committee is emphatic in its opinion of the advantages of a standard two-part tariff, and suggests it to be suitable for universal statutory adoption at the consumer's option as an alternative to a flat rate. It will be recalled that a multi-part tariff was introduced at Poplar 20 years ago by Mr. J. Horace Bowden, and his subsequent experience of its application has not caused him to alter his opinion of its equity.

The recommendation that the secondary kWh portion of the charge should be uniform throughout each particular area of supply is sound, but there would seem to be some ground for doubting whether existing methods of assessing the fixed service portion of the charge are any more arbitrary than the recommended "size-of house" basis (ascertained by external measurement of the ground-floor area and multiplied by the number of floors); indeed, in the case of rural-area supplies, even the Committee itself is not unanimous in this respect. However, the large number of variants at present in use is conclusive evidence of none being wholly without defects of some kind or other, and until the "best" method is devised one must perforce tolerate the least objectionable.

Meanwhile, should the report lead to nothing more than a reduction of the multiplicity of tariffs in use to-day, it will have rendered service of no mean value to the industry, since the gravity of permitting the general public to continue to regard it, however erroneously, as operating without proper statutory control in respect of tariffs and methods of charging for energy is not always appreciated with its true significance.

Hire-purchase in the Electricity Supply Industry.

Experience has shown abundantly that electrical development has made the greatest headway in those districts in which the authorised electricity undertakers have provided facilities for the wiring of premises and the installation of appliances on what are colloquially known as "easy terms." That being so, it is a matter for wonder that all supply undertakings have not followed suit, with beneficial effects upon all other sections of the electrical industry. When more wiring and domestic appliances are installed electrical contractors, retailers, and manufacturers receive immediate benefit and the supply authority sells more energy and improves its load factor. This leads eventually to more power plant, transformers, cables and switchgear, thus bestowing further benefits upon another important class of manufacturers. In view of this, why do supply authorities hesitate to institute facilities for assisted wiring and the hire and hire-purchase of apparatus?

This was one of the questions examined by the Committee appointed by the Electricity Commissioners to deal with the subject, whose report is reviewed in this issue. The question brought forth several kinds of reply, but the main one seemed to be "There is no demand."

In these days of extensive and intensive "publicity" it should hardly be necessary to point out that demand is created by making known in an effective way that certain services or commodities are available. It is safe to say that the bulk of the people want electricity, but the first cost is a serious handicap. Therefore if supply authorities will announce their readiness to install wiring and provide appliances upon a system which will spread the cost over a reasonable period there can be no doubt that they will meet with an immediate response.

We accordingly join with the Committee in urging this important matter upon those authorities who have so far not made use of the powers with which the 1926 Act invested them, feeling certain that "a trial will convince."

The Far East Economic Mission.

The principal feature of the Economic Mission to the Far East (which practically means China), the formation of which was announced last week, is its strong representation of the textile industries which have been so badly hit by the prevailing depression and so need the stimulus which the Mission may be able to provide. From the electrical point of view, the appointment of Lt.-Col. R. K. Morcom to the Mission is the most important matter. Col. Morcom is a leader of the industry, having been chairman of the B.E.A.M.A. Council, two or three years ago, and he may be relied upon to see that the engineering export trade is given adequate attention by the Mission.

The need for such a Mission is very apparent. It is noteworthy that in spite of serious internal troubles China's import trade has continued to expand at a remarkable rate, but while the imports from our chief competitors have grown our own trade has remained practically stationary. The Mission will examine the causes of this unfortunate state of affairs and will make recommendations for its improvement.

The cotton industry is contributing £6,000 towards the £17,000 which the Mission's tour is expected to cost. Mr. Gillett suggested that perhaps other industries would like to send representatives at their own expense to act as consultants to the Mission. Any suggestions which are likely to render the visit more fruitful should be communicated as soon as possible to the Overseas Trade Development Council at the D.O.T.

The I.E.C. Northern Tour.

Some notes on the concluding portion of the delegates' tour, with illustrations of places of interest visited in Norway and Lapland.

By G. W. MOLLE, B.Sc.(Eng.), A.M.I.E.E.

THROUGHOUT the whole of the proceedings of the International Electrotechnical Commission in Denmark, Sweden, and Norway a tremendous amount of hard work was done by the various national committees in whose countries meetings were held, and the I.E.C. organisation once again demonstrated what could be achieved for the instruction and convenience of delegates during sight-seeing tours no less than at the technical sessions.

The northern portion of the excursion afforded an opportunity of becoming acquainted with parts of the electrical network in the south of Norway, which supplies Oslo, amongst many other towns, and includes a score of water-power generating stations, the three largest of which are those at Nore, Vamma, and Morkfoss-Solbergfoss. Fig. 1 shows the Nore station's dam and sluices; the dam is connected to the station by a tunnel 5 km long, through solid granite, and an aluminium-painted pipe line, shown in fig. 2. The station is of 112,000-kVA capacity. Fig. 3 is a view of transformers and switchgear, outgoing from Nore. Each transformer is of 29,000-kVA capacity and forms a "tied" unit with its own generator. Step-up is from 12,000 V to 132,000 V, and synchronising takes place on the 132,000-V side. The 132-kV line, including a novel design of tower, are depicted in fig. 4. The river, which cannot be seen in this illustration, flows between the sub-station and the first tower. The Nore station was put into service

Fig. 1.—Nore Dam and Sluices.

Fig. 2.—Pipe-line at Nore.

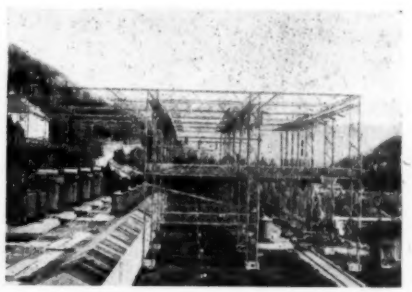
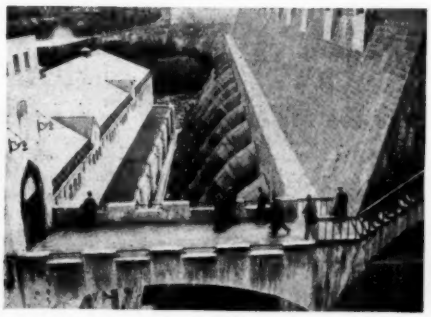
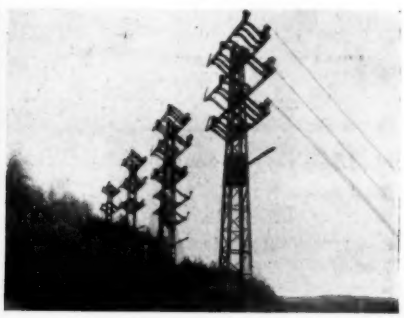


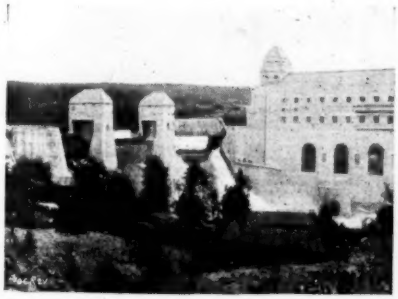
Fig. 3.—Transformers and Switchgear.

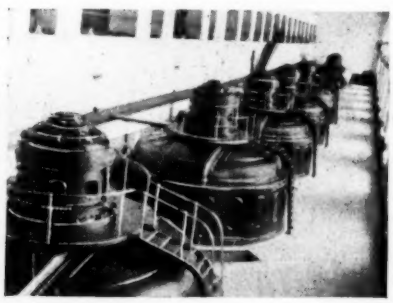
Fig. 4.—Transmission Line, 132-kV.





Figs. 5 and 6.—Vamma Power House Entrance and 50-kV Lines.





Figs. 7 and 8.—Morkfoss-Solbergfoss Station and Generators.

Fig. 9.—Kirunavaara Iron-ore Mine.

in 1928, and it will eventually contain 260,000 kW of plant.

The next illustration (fig. 5) shows the entrance to the Vamma station, with the dam and turbine-intakes. This station is of 102,000-kVA capacity; at the far end of the dam (fig. 5) pipes for six more generating sets can be seen. Fig. 6 illustrates the peculiar construction of the outgoing 50-kV transmission-lines from Vamma, due to the steep slope on which the towers stand.

The Morkfoss-Solbergfoss station, fig. 7 (70,000 kVA), with its dam and sluices, has outgoing 65,000-V lines in the direction of the observer. All switchgear and transformers are inside the station. The generators appear in fig. 8; there are seven sets, each consisting of an 11,500-h.p. turbine and an 11,000-kVA winter-capacity 3-phase generator.

A Norwegian waterfall at Bordo, far north of the arctic circle, has been "harnessed" for power supply. The station there supplies small towns, farms &c.

The Kiruna mine mountain of iron ore contains 750 million tons of ore, and the annual output is 6 million tons (metric). Fig. 9 shows the method of open working. The sheds in the centre house the electrically-driven ore crusher, said to be the largest in the world. Fig. 10 shows a man extracting ore with a pneumatic pick, fig. 11 an electrically-driven shovel loading ore into trucks for conveyance to the crusher, and fig. 12 an ore-train bound for Narvik, the terminal port of the Riksgraus railway (see fig. 13). The absence of real darkness in northern lands is strikingly indicated by this photograph (fig. 13), which was taken at 2.30 a.m.

An 80-kV overhead transmission line carried through mountain country on steel towers of triangular section feeds the railway with power generated at the Porjus station. Fig. 14 is a view of parts of the 80-kV power line, the overhead railway trolley wire, and fences erected to check snow drifts. Fig. 15 shows the power line crossing over the railway, the construction of the trolley wire (16 kV at 15 cycles), and a 10-kV, 60-cycle, line for lighting.

Fig. 10.—Pneumatic Iron-ore Pick.

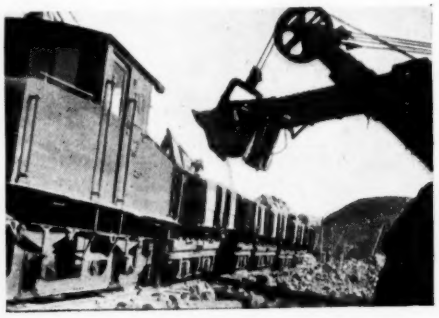


Fig. 11.—Electric Ore Shovel.

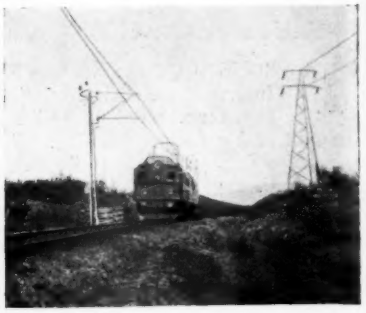


Fig. 12.—Electric Ore Train, Abisko.

Fig. 13.—Narvik, showing Ore-shutes.

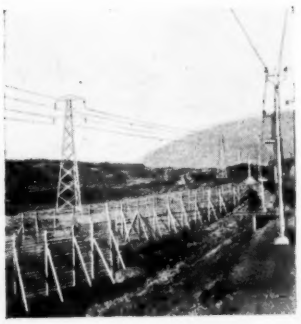


Fig. 14.—Snow Fences and 80-kV Line.

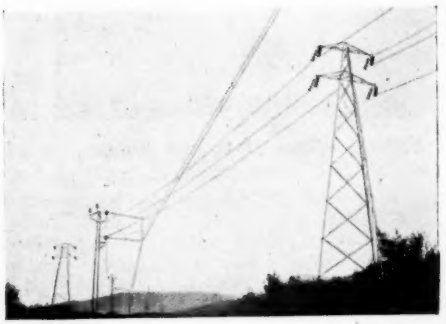


Fig. 15.—Power Line Crossing Railway.

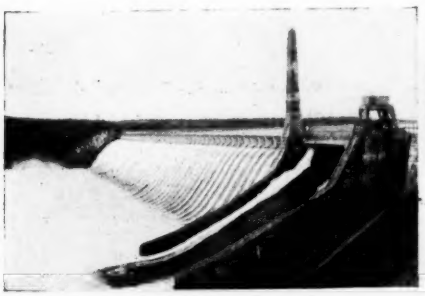


Fig. 16.—Porjus Dam, Lapland.

Fig. 17.—Harspränget Falls.

Fig. 18.—The Midnight Sun.

The dam of the Porjus power station in Lapland is shown in fig. 16. This station supplies power to the Riksgraus railway, the Kiruna mines, and various towns also, and for agriculture. The power house is built in the rock, 50 metres below ground, and contains 100,000 kVA of plant.

Fig. 17 shows the Harspränget Falls, two miles long, near Porjus, shortly to be developed for power supply.

The midnight sun over lake Tornetrask, alongside which the Riksgraus railway runs to Narvik, is shown in fig. 18. From Mount Unolja, at the summit of which this photograph was taken, the sun can be seen appearing to move horizontally along the top of the mountain range shown.

The Design of Bus-bars and Connections.—II.*

Considerations affecting the use of different types of conductors and cables in indoor sub-stations.

By H. E. HUTTER.

MODERN developments in power house design have resulted in so great an increase in the capacity of installed plant that a short circuit at or near the bus-bars may produce a current of the order of 100,000 amperes. When heavy short-circuit currents are possible, careful attention must be given to the design of the bus-bars and connections to prevent troubles from heating and mechanical stresses under abnormal conditions.

The repulsion between three bars in the same plane, as is usual in three-phase work, can be calculated from the formula

$$F = \frac{8.1 \times I^2 \times 10^{-7}}{d}$$

where F = maximum repulsion force between the bars in lb. per foot run, I = initial value of the total current in amperes, and d = spacing in inches between centres of the bars. Fig. 1, which is from a paper by Leonard and Riber published in the *Electric Journal* of December, 1917, shows the repulsive forces set up between conductors in the same plane by short-circuits on all phases and also two bus "shorts." These repulsion stresses require to be considered when selecting the supports and the size of conductor. Tests have shown that the conductors as well as their supports vibrate, due to the application of sudden forces (see *Journal* of the A.I.E.E., February, 1925). In these tests the supports vibrated with a frequency of 30 to 1,700 cycles per second, and the conductors with a frequency of 8 to 150 cycles per second. It can thus be seen that it is possible for the supports and/or conductors to vibrate in synchronism with the system frequency and greatly increase the stresses set up. When single-post insulators are used for the supports care must be taken that they have sufficient strength to resist the initial shock on the occurrence of a short circuit. When the bars are arranged as in fig. 3 (*a*) no attention need be paid to possible deflection, unless the width of the strip is less than 3 in. or the span between the supports over 6 feet, but when arranged as in fig. 3 (*b*) care must be taken that the bars cannot be deflected sufficiently to reduce the earth clearance to a dangerous figure.

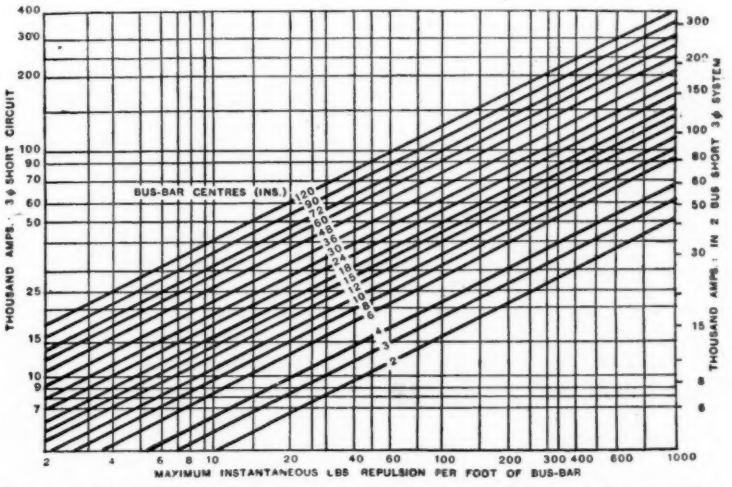

THOUSAND AMPS. - 3 φ SHORT CIRCUIT
THOUSAND AMPS. - IN 2 BUS SHORT 3 φ SYSTEM
BUS-BAR CENTRES (INS.)
MAXIMUM INSTANTANEOUS LBS REPULSION PER FOOT OF BUS-BAR

Fig. 1.—Short-circuit Repulsive Forces between Bus-bar Conductors.

Current Rating of Conductors.—The current-carrying capacity of a conductor should be governed by B.E.S.A. Specification No. 159, which lays down that the temperature rise of any connection or bus-bar should not exceed 30 deg. C. for single bars, or 35 deg. C. for multiple bars, above that of the surrounding air, providing that the temperature of the air does not exceed 40 deg. C.; shunts and instruments are not included in this ruling. To prevent uneconomical losses and reduction of mechanical strength, the maximum density must not exceed 1,000 amperes per square inch for copper, and 650 amperes per square inch for aluminium. With the heavier current connections for a.c. due attention must be paid to skin effect, as this reduces the effective rating, compared with d.c. with bars of about 6,000-ampere capacity and over, and it is necessary to allow for the individual bars composing each phase to be changed over, the inner bars being brought out to the outer position; this balances the induced e.m.f.'s, and helps to obtain an even distribution of current. It is necessary to provide light insulation between the bars, as there is a difference of potential between them. If it is anticipated that a bus-bar system will be extended in capacity at some later date to 6,000 amperes or so, this transposition should be allowed for in the original installation to save rebuilding the bars later.

When laying out flat-back switchboards a considerable amount of material for bus-bars can be saved by careful arrangement of the panels; all generators should be placed close together, with the heaviest feeders adjacent to them, so saving the running of heavy bars the entire length of the board.

Jointing.—The joints in the bars can be made by overlapping the bars, or else by the use of fish plates, the whole being clamped or bolted. Clamps with either three

* For a previous article on the design of bus-bars and connections for outdoor sub-stations see Elec. Rev. of May 9th, 1930.

or four bolts make a very flexible job, but the extra clearance required by the clamps may be a disadvantage in cell work or confined space. When used for a.c. work one half of the clamp or the bolts on one side should be made of non-magnetic material to prevent eddy currents.

TABLE I.—Current-carrying Capacities.

Copper Rod. Diameter. inch.	D.C.	25~.	50~.	Aluminium Rod. Diameter. inch.	Current A.C. & D.C.
1/2	350	350	350	1/2	127
5/8	475	475	475	5/8	200
3/4	620	620	620	3/4	288
7/8	750	750	750	7/8	390
1	888	875	850	1	510
1¼	1,210	1,190	1,120	1¼	770
1½	1,570	1,500	1,380	1½	990
1¾	1,930	1,780	1,600	1¾	1,230
2	2,300	2,080	—	—	—

Rods fixed in a vertical position; deduct 15% if horizontal.

Copper Strip (1 Bar). Section.	Amps. A.C. & D.C.	Aluminium Strip (1 Bar). Section.	Amps. A.C. & D.C.
1¼×¼	375	1¼×¼	244
2 ×¼	500	2 ×¼	325
2½×¼	625	2½×¼	400
3 ×¼	750	3 ×¼	490
4 ×¼	1,000	4 ×¼	650

Copper strip. (4 in.×¼ in. with ¼ in. space.) No. of Strips.	D.C.	25~.	50~.	Aluminium strip. No. of Strips.	D.C.	25~. 50~.
1	1,000	1,000	1,000	1	650	as d.c.
2	2,000	2,000	2,000	2	1,200	,,
3	3,000	3,000	2,900	3	1,800	,,
4	4,000	3,800	3,400	4	2,400	,,
5	4,950	4,600	—	5	3,000	,,
6	5,790	5,000	—	6	3,600	,,

The actual overlap for both copper and aluminium should be ten times the thickness of the bar, or, where the width exceeds this figure, as is usual, the overlap will be the same as the width. All copper joints should be tinned, and aluminium scratch-brushed under a layer of vaseline. Aluminium connected to copper in a dry situation requires no particular precautions, but when moisture is present it is important that the joint be painted over when completed. The efficiency of a bolted joint depends entirely on having sufficient bolts of correct size. Table II provides a guide to this.

TABLE II.—Sections of Strips to be Joined and Sizes of Bolts Used.

Size of Strips ...	1×1"	1½×1"	2×1"	2×1½"	2×2"	3×1"	3×2"	3×3"	4×1"	4×2"	4×3"	4×4"
Size of Bolts ...	⅜"	½"	⅜"	⅜"	⅜"	½"	⅜"	½"	½"	⅝"	½"	⅝"
No of Bolts ...	1	1	2	2	4	2	4	4	2	2	4	4

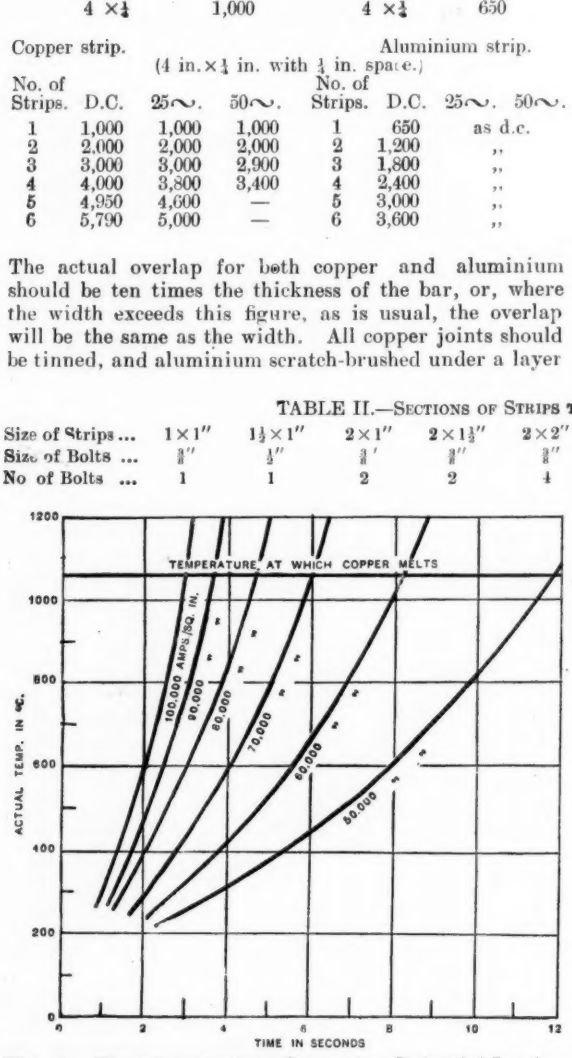


Fig. 2.—Time-temperature Curves for Potential Leads.

Expansion.—With heavy-current bars due allowance must be made for expansion, unless the total length is short. Arrangements can be made to allow the bars to slide freely in their supports, but usually the connections to circuit breakers, &c., are so stiff that movement is not possible, thus making expansion joints a necessity. These should be made up of laminations of copper in preference to solid pieces of soft copper, as the latter tend to harden with the repeated expansion and contraction. The actual spacing of the joints depends on the section of the bars, but varies from 12 to 25 feet usually.

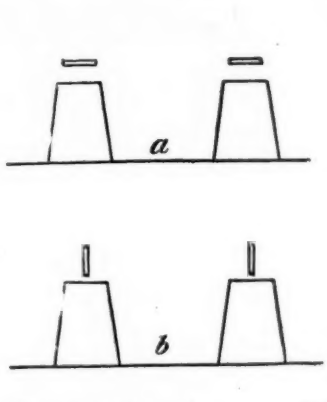


Fig. 3.—Alternative Arrangements of Bus-bars.

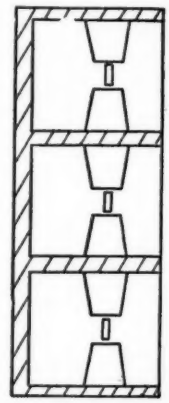


Fig. 4.—Compression-type Bus-bar Supports.

Supports.—For the lower and medium voltages, supports built up of slate blocks are very satisfactory, the blocks acting as struts between the bars under short-circuit conditions. Porcelain insulators should always be made by the wet process to obtain the maximum strength; average values are 1,500 lb. per square inch in tension and 18,000 lb. per square inch in compression. The very low tensile strength of this material has resulted in the introduction of the compression type of support which is shown in fig. 4. With this design the stress on the porcelain under all conditions is compressive only. Insulated steel rods and similar constructions, while of great mechanical strength, are seldom used for the class of work under consideration.

TABLE III.—Minimum Sections of Connections.

Short-circuit kVA of Plant.	Voltage.	Minimum section.
1,000,000 ...	11,000 ...	.375 sq. in.
	22,000 ...	.25 ,,
	33,000 ...	.125 ,,
500,000 ...	3,000 ...	.375 ,,
	6,600 ...	.25 ,,
	11,000 ...	.125 ,,
	22,000 ...	.125 ,,
250,000 ...	3,300 ...	.25 ,,
	6,600 ...	.125 ,,
	11,000 ...	.125 ,,

TABLE IV.—Taping of Conductors.

Working Voltage.	Number of Layers. Round Bars.	Rectangular Bars. .007 thick.	Test Voltage.
650 ...	1 ...	1 ...	2,000
2,200 ...	3 ...	4 ...	7,000
3,300 ...	4 ...	7 ...	10,000
5,500 ...	7 ...	— ...	16,500
6,600 ...	8 ...	— ...	20,000
11,000 ...	14 ...	— ...	30,000

Connections.—The connections should be as carefully considered as the main bars, and due account should be paid to their mechanical strength to ensure that they have adequate support. When small connections, such as potential leads, are connected directly on to the bus-bars, a short circuit on that particular piece of apparatus may expose that connection to such a heavy current

that the temperature may be raised to a dangerous figure in a very short period of time. Under these conditions the loss due to radiation, &c., may be neglected, and the actual temperature rise will be limited only by the weight of the connection and its specific heat. Fig. 2 shows the time required to reach melting point with different current densities, based on these conditions.

Table III gives minimum sections of connections for different plant capacities, as suggested by Mr. A. Coates in his book on the "Choice of Switchgear."

Insulation.—While not the general rule, cases occur in which the bars and connections are required to be insulated, either throughout their entire length or in places where the clearances are reduced, such as oil-switch terminals. When insulated throughout the entire length micanite, bakelite, or similar material may be used, capable of withstanding the full test voltage, but when insulated only at points of reduced clearance, varnished cambric applied half lap is convenient, the number of layers varying according to the voltage.

When considering the use of insulation for bus-bars and connections it should be borne in mind that the insulation will restrict the free ventilation of the conductor, and consequently the current density must be substantially reduced to allow for it; this, however, does not apply to short lengths of taping, such as for switch terminals or where connections pass close to earthed metal with reduced clearance.

Change-overs and Replacements.

A study of the obligations of electricity undertakers and the rights of consumers when systems of supply are altered.

By J. W. THOMAS, LL.B., B.Sc., A.M.I.E.E.,
(*Barrister-at-Law*).

MANY electricity undertakers are at the present time engaged in the laborious process of changing over their supply from d.c. to a.c., or of altering their frequency in accordance with the requirements of the Central Electricity Board, and numerous intricate problems are arising therefrom. Not the least difficult is the one concerned with the respective rights and obligations of consumers and undertakers. In order to resolve their doubts both parties anxiously search the electricity legislation covering the period 1882-1926, but unfortunately without discovering anything very explicit on the point as to whether the consumer has any rights and the undertaker any obligations in regard to the replacement of apparatus or plant when a change of system is effected, either on the initiative of the undertaking itself or on the instructions of the Electricity Commissioners or of the Central Board. It is, of course, now common knowledge that electricity authorities are making a practice of replacing apparatus which is rendered unsuitable by a change of supply, or, alternatively, of paying compensation, but there is a good deal of uncertainty as to how far they are legally obliged to, or whether a consumer has the right to resist a change if the undertaker declines to meet his requirements for making his installation and apparatus suitable for the new supply. It is doubtful whether the Legislature when framing the Electricity Acts contemplated the possibility of a consumer's apparatus being rendered unfit by a change of system. It was appreciated that damage might be caused to bodies and persons as a result of constructive work carried out by an undertaking in fulfilment of its obligations, and specific provision was made for it, but apart from enacting that the system of supply given by the undertaker must be approved by the Board of Trade (now the Electricity Commissioners) and precluding the undertaker from interfering in the manner in which a consumer used the supply, the Legislature made no definite provision for safeguarding the interests of the consumer in the event of a change of system taking place. The matter has already been discussed in these columns and whilst it cannot be said that the position has been made more definite by decided cases, it might be helpful to refer to it again and more particularly to certain practical questions which are still cropping up.

It would be as well at the outset to mention briefly what the present position of the law is in respect of the mutual rights and obligations of undertakers and consumers. In the first place there is a duty upon undertakers to give the consumer a supply of electricity subject to certain stipulations and the supply is to be given only by means of some system approved by the Electricity Commissioners. In accordance with the Commissioners' Regulations the undertakers must declare the system and pressure of the supply which they propose to give. The Regulations also contain provisions for the supply being maintained constant and at the declared pressure. The consumer naturally purchases apparatus and plant suitable for the supply on the assumption that it will be maintained unchanged, and it might be argued that he has a common law right to recover damages for any loss sustained by an alteration of the basis on which the contract was founded. It is doubtful, however, if this right could be upheld successfully in view of another provision in the Regulations whereby an undertaking may alter its system of supply with the consent of the Commissioners and also of the provisions of Section 24 of the 1919 Act which empowers the Commissioners to require an undertaking to amend or alter its type of current, frequency or pressure. If the Legislature intended that this right could only be exercised subject to compensation being paid to consumers who are injuriously affected it would presumably have said so in express terms. In the absence of such provision the consumer would appear to have no statutory redress. The Commissioners, when granting the necessary authority, may, however, impose such terms and conditions as they think fit and it has been their practice when giving their consent to a change of system to attach a condition that unless otherwise agreed the undertakers shall, at their own expense, carry out alterations to consumers' existing apparatus to suit the altered system or alternatively pay to each consumer injuriously affected by the alteration the reasonable cost of, and incidental to, the change, with provision for arbitration in the event of disagreement between the undertakers and consumers.

As this power to impose conditions is contained in the Regulations which the Commissioners have the statutory authority to make, it follows that the conditions acquire the force of statute and penalties can be imposed for default. There are two questions which naturally arise at this juncture.

(1) Assuming that the Commissioners in granting consent omitted to impose the condition, or (2) assuming that the condition was imposed and the undertaker defaulted, what remedy, if any, would the consumer pos-

sess, and against whom? In the latter case the consumer would obviously be justified in calling the attention of the Commissioners to the default and the latter could proceed against the undertaker by way of penalty, but it is doubtful whether the consumer himself could recover compensation, seeing that he is not a party to the arrangement with the undertaker. In the former case, whilst it is improbable that the Commissioners would decline, or omit, to impose the condition there would appear to be nothing in the various Electricity Acts which makes it incumbent upon them to do so. In the event of an omission could the consumer substantiate a claim?

It has already been indicated that there is no express provision in the sections dealing with alteration of system or frequency for compensation to be paid to consumers who are affected, and one has therefore to fall back on other portions of electricity legislation to see whether any other remedy is available. The Electric Lighting Act, 1882, contemplated that in exercising its powers an undertaking might cause damage to other bodies or persons for it is enacted in Section 17 that, "In the exercise of the powers in relation to the execution of works given them under this Act or under any licence, order or special Act, the undertakers shall cause as little detriment and inconvenience and do as little damage as may be and shall make full compensation to all bodies or persons interested for all damage sustained by them, by reason of or in consequence of the exercise of such powers. The amount of such compensation in case of default to be settled by arbitration." It is extremely probable that the Legislature when framing this Section had in mind the possibility that other bodies and persons might be injuriously affected by constructional work such as the erection of machinery, excavation of land, laying cables, &c. It is doubtful, however, whether the possibility occurred to it of detriment being caused due to a change of supply. It was held in one case (Shelfer *v.* City of London E.L. Co.) that Section 17 only related to damage done in the execution of the undertaker's works and not to damage done afterwards by the use of plant, the erection of which was completely finished, in other words, that Section 17 did not apply to damage caused when the supply was actually being given. It is a moot point whether it might not be contended that the loss sustained by a consumer must have occurred after the new supply had commenced and not whilst the change-over was in progress, in which case he would have no redress under this section. The definition given of "works," however, in the same Act is very broad, *viz.*, "works means and includes electric lines, also any buildings, machinery, engines, works, matters or things of whatever description required to supply electricity and to carry into effect the object of the undertakers under this Act." It is conceivable that the phrase "or things of whatever description required, &c.," might be interpreted to cover the case of detriment arising from a change of supply.

It is worth noting that by Section 28 of the 1899 Act where a consumer has required an undertaker to supply him with a maximum power of any amount "he shall not be entitled to alter that amount except upon one month's notice, and any expenses reasonably incurred by the undertakers in respect of the service lines by which energy is supplied to the premises of that consumer or any fittings or apparatus of the undertakers upon those premises consequent upon the alteration shall be paid by him to the undertakers." It might justly be contended that if the consumer has to meet expenses incurred by the undertaker in readjusting his supply the converse should hold and that an undertaker ought to accept responsibility for apparatus which needs replacing as a result of a change of system. Whilst, however, the Legislature provided specifically for the one case it failed to provide for the other.

Section 9 in the Act of 1926 sheds an indirect light on the matter. It provides for the changing of the frequency of supply of an undertaker on the instructions of the Central Electricity Board "subject to the payment to the authorised undertaker or owners of any expenses which they may properly incur in carrying such requirements into effect, including the cost of altering and replacing plant belonging to consumers." Whilst the Section merely refers to the possibility of a consumer's apparatus being replaced and does not expressly create any rights so far as he is concerned, it is clear enough to indicate that undertakers have certain obligations towards consumers who are adversely affected by the change of frequency carried out on the instructions of the Central Board.

The above is as much as can be said at present and one will have to await an actual case being fought before a definite opinion can be pronounced. So long as the Commissioners make it a rule that undertakers must replace apparatus or pay compensation it is hardly likely that the point will be contested; certainly the matter does not appear to have been before the courts as yet, so far as the writer is aware.

Granted that the obligation is imposed by the Commissioners on an undertaker to replace apparatus, we may next inquire as to what is the extent of this obligation: (1) as regards the consumer's apparatus and plant, and (2) as regards his installation. Strictly speaking, undertakers have no power to interfere with, or to restrict the choice of, apparatus used by a consumer provided that the latter does not use or deal with the supply in any manner so as to interfere with the supply of electricity to any other consumer, in which case the undertaking may, if it thinks fit, discontinue to supply energy. Subject to this, the consumer can do what he likes with the supply on his side of the terminals and can use what apparatus he prefers. The undertaker, however, is not compelled to give a supply of energy to any premises unless reasonably satisfied that the electric lines, fittings and apparatus therein are in good order and condition and not calculated to affect injuriously the use of energy by the undertakers or by other persons. If any difference arises as to any improper use of energy or as to any alleged defect in any electric lines, fittings or apparatus, that difference must be determined by arbitration. It is the practice of some undertakers to refuse to approve for connection to the mains such apparatus as d.c. battery eliminators, on the grounds that they are regarded as a potential source of danger and they decline to replace them in the event of a change-over of supply. Whether they are in the right or not has never yet been definitely decided. It is clear, however, that if a consumer challenged such action the burden would be upon the undertaking to prove that the apparatus endangered the supply, and if it failed in discharging this burden the consumer would be entitled to use such apparatus and to have it replaced. The test would presumably be whether it conformed with the I.E.E. Regulations. Where any difficulty arises as to replacement or as to the amount of compensation, arbitration is resorted to.

Replacement is often a costly matter and undertakers naturally do their utmost to keep the expense down to a minimum. In many cases where the change is one of pressure on an a.c. supply, transformers are installed so as to avoid the expense of replacing apparatus, or where it is a change of frequency, frequency changers may be provided. Radio eliminators probably form the biggest source of worry and contention and they are a still greater cause of irritation to the undertakers because they bring in such a small revenue. Another factor is that the apparatus replaced is often very old and almost worthless, whereas new apparatus has to be substituted for it. Undertakers therefore endeavour to limit the quantity of apparatus to be replaced by serving a notification on the consumer of the intention to change over and intimating that only apparatus which was installed prior to that date will be replaced. Whilst it is obligatory by virtue of the Regulations for an undertaker to give public notice of an intention to apply for consent to change the supply, there is no corresponding obligation on the part of the undertaker to notify the consumer, though it is the usual practice to do so. Queries have arisen as to whether some limitation could not be placed upon the obligations of undertakers as regards consumers' apparatus which had been connected

to the system without notification to and/or approval by the undertaker. In some quarters it has been thought that undertakers ought not to be called upon to accept liability for apparatus which had been connected without their knowledge and approval. In view, however, of the provisions of Section 18 of the 1882 Act referred to above, which preclude an undertaker from prescribing any special form of lamp or burner to be used by the consumer, or from interfering in any way with the manner in which electricity supplied to a consumer is used, and also the protection in Section 28 of the Act of 1899, in respect of any alteration in the maximum power with which a consumer is entitled to be supplied, it is doubtful whether any condition made by the undertakers requiring the consumer to give notification of apparatus installed could be enforced. It is also very questionable whether the absence of such notification by the consumer of apparatus installed after receiving intimation of a change-over would deprive him of the right to have his apparatus replaced. The Commissioners have had this point under consideration and as regards apparatus installed by consumers in good faith prior to the date of the consent to a change of system have adopted the rule that no distinction can be made and the undertakers must accept responsibility for it whether they have approved it or not. With regard to apparatus installed between the date of consent and the date of the actual change-over, the Commissioners decided that there was a case for making some provision which would protect the undertakers against unreasonable action by consumers during that period. They could not go so far as to absolve the undertakers from liability in respect of all apparatus installed after the date of consent in view of the time which would necessarily elapse between the date of consent and the completion of the change-over, but after taking advice they decided to insert a provision in their consent whereby in cases where the undertakers were prepared to give individual notification to consumers within a reasonable period before the date actually fixed for effecting the change-over, no liability should rest on the undertaker in respect of additional apparatus installed between the date of such individual notification and the date of the change-over, unless otherwise agreed. It is this form of consent which is now in general operation, and its wording is to the effect that where notice of their intention to carry out the necessary alteration to consumers' existing apparatus was served by the undertakers on any consumer, not less than one month and not more than six months prior to the date fixed for the alteration, no liability should attach to them in respect of apparatus installed by the consumer after the service of such notice unless otherwise agreed.

So far this discussion has been confined to the question of plant and apparatus. Questions have, however, been occasionally raised as to whether the undertaker can be called upon to meet any additional expenses which may be incurred by the consumer in making his installation safe for the new supply. A change-over from d.c. to a.c. may increase the possibility of danger and may render it advisable for additional precautions to be taken. If the new supply necessitates a modification of the installation which was not essential under the I.E.E. Regulations before, *e.g.*, with regard to earthing, then doubtless the same principles would apply as in the case of apparatus and the undertaker would be bound to give compensation for the expenses incurred.

It is hardly conceivable that such a contingency would often arise, certainly not in the case of a change-over from 200 V d.c. to 230 V a.c., as the same regulations apply in both cases and if the installation conformed with them before the change, no alterations would be necessary to meet the new conditions. If the installation did not previously conform with the I.E.E. Regulations and the consumer, in order to ensure that it is made safe for the new conditions decides to improve his installation, he can hardly expect the undertaker to be saddled with a liability which he ought to have shouldered himself when his installation was put in originally.

Capital and Revenue Expenditure.

Methods of Recording them in the Electrical Trades.

By S. HOWARD WITHEY, F.C.I., &c.

To those responsible for the organisation and administration of the financial side of an electrical manufacturing or equipment business, one of the principal difficulties encountered at balancing time consists of the rational distinction to be drawn between expenditure which is of a capital nature, and expenditure which should be charged against the periodical profits. In this connection experience has proved that unless a proper and thoroughly intelligent discrimination is made between these two classes of expenditure, the whole of the book-keeping and accounting involved in the preparation of the final accounts and balance-sheet will be practically useless, and a very considerable amount of analytical work will have to be undertaken in order that the book values placed upon the various assets employed for profit-earning purposes shall represent, as nearly as possible, their real values to the business as a going concern. In any case, failure to differentiate between capital and revenue expenditure in accordance with the accepted principles of modern accounting will inevitably cause a delay in the tabulation of the final figures, and it cannot be too strongly emphasised that instead of postponing the allocation of the different items to the end of the financial year, or relying on the auditors to deal with the figures in a proper manner, the transactions should be completed in the books directly the amounts have passed through the subsidiary books, or books of original entry.

The essential principles which govern a correct discrimination between capital expenditure and revenue expenditure can perhaps best be appreciated by considering a few simple and typical examples. In the matter of repairs and renewals, if the expenditure involved has the effect of increasing the productive efficiency of the particular machinery or plant, &c., as compared with the original efficiency upon which the entry on the debit side of the asset account was based, the cost of such repairs or renewals should be capitalised by posting the amount from the cash book, or from the purchases journal, as the case may be, direct to the private ledger account. Unless the real value of an asset is actually increased, and providing the book value of a displaced unit has not been already charged against the profits, the cost of replacements should be shown on the debit side of the nominal or expenses account, the final balance of which will appear on the debit side of the periodical profit and loss account. It often happens that a machine is replaced by another machine possessing a greater productive efficiency, the debit balance of the asset account being allowed to remain unaltered

until the final accounts are drafted, and although it is usual to capitalise the cost of the new machine after writing off the book value of the old machine, a secret reserve may be created by debiting the replacement to profit and loss and by maintaining the book value of the replaced asset. When additional machinery or plant is acquired, that portion of the purchase which has the effect of adding to the existing stock should be capitalised by recording the amount on the debit side of the machinery or plant account kept in the private ledger, a percentage or proportion being written off against the profits annually to cover depreciation, obsolescence, &c.

When an electrical business is purchased as a going concern, the cost price of the assets taken over should be treated in the books of account as capital expenditure. To ensure that these original transactions are recorded in a proper manner, it is advisable to open a special "Purchase of Business Account," the assets being grouped under suitable headings and enumerated on the credit side, and the liabilities shown under their respective heads on the debit side. The actual cost price of each asset can then be posted direct from this account to the debit side of a separate account opened in the new private ledger, with the date of transfer and the words "To Purchase Account," and the amount of each liability posted to the credit side of its proper account, reading "By Purchase Account." The difference between the two sides of the purchase account should correspond with the consideration mentioned in the agreement between purchaser and vendor, and this amount should be transferred direct to the credit side of an account opened in the vendor's name, this account being subsequently debited with the sum or sums actually paid by the purchaser. In the event of the consideration being in the form of shares in a limited liability company, the amount representing so many fully-paid shares of so much each should be transferred from the vendor's account to the credit side of the share capital account.

Although the expenses incurred in the formation of a limited liability company—such as the cost of preparing and advertising the prospectus; the cost of drawing up and printing the memorandum and articles of association; fees and deed stamps; legal and professional charges, etc.—cannot be regarded as capital expenditure, the total amount involved may be spread over a period by capitalising the item and writing off a percentage or proportion each year. Legal expenses incurred in connection with the purchase of land and buildings is really a capital charge, but in order to conserve the resources of the company such capital additions should be written off against the profits as soon as possible. Discount on debentures issued by a company should be charged against the profits over a number of years, the amount being debited to capital account in the first instance, and a sum written off at the termination of each financial year or accounting period.

The original payment for the goodwill of a business is, of course, a capital charge, but the intangible nature of this asset often renders it a troublesome item to deal with in the accounts. The actual position may be very clearly defined by leaving the first cost of the purchase of goodwill on the assets side of the balance sheet, and by showing as a deduction from this amount the total sum actually written off against the profits to date.

The following table will serve as a guide to the systematic allocation of capital and revenue items:—

Capital Items.	Revenue Items.
The cost of purchasing freehold or leasehold property. Legal expenses incurred in connection with the transfer.	Repairs to the property. Ground rent. Sum written off to provide for shrinkage in actual value or for the lapse of time. The legal expenses, as soon as possible
The cost of purchasing new or additional boilers, machines, meters, engines, generators, heating units, motors, &c. Carriage and cartage on same up to arrival on the premises. The cost of repairing second-hand plant, machinery, instruments, or appliances necessary for immediate efficiency as profit-earning assets.	Ordinary repairs. Amount written off to cover depreciation caused by wear and tear and obsolescence. The sum required to extinguish the book value of the old asset or assets displaced Loss on sale of any asset.
The cost of installing telephones, electric light fittings, fixtures, &c.	All expenses incurred in their repair and maintenance.
The cost of extending the business premises, including the wages paid to own employés who have taken part in any of the operations.	Ordinary repairs and maintenance. Depreciation.

Electricity for the Home.

Selections from Recently Introduced Manufacturers' Products.

A New Electric Iron.

The "Alpha" electric iron recently introduced by Messrs. Alpha Electrical Apparatus Co., Ltd., Premier Works, Percy Road, Greet, Birmingham, is

Fig. 1.—Construction of "Alpha" Iron.

claimed to represent a big advance in design, it being made on an entirely new principle. The construction of the iron is depicted in fig. 1. No mica is used, and the element is of a new patent beaded type laid in a trough arranged in the base of the iron in such a manner that greater proportional heat is obtained at the point of the iron, where it is most needed. As a result of the new construction it is claimed that the heating up is quicker, and that the heat is retained longer.

The plug pins are fitted to a bridge piece quite separate from the cover. The general construction is very strong, and the iron is fitted with a convenient thumb rest and a removable back rest.

The appliance is nickel-plate finished, and is supplied complete with two yards of flexible lead and a b.c. adaptor. It is made in two sizes, 4½ and 6 lb., and the loading is 350 W.

An Electric Milk Boiler.

The "Inventum" electric milk boiler, fig. 2, is typical of modern electrical efficiency. It has a capacity of two pints, and with a loading of 500 watts the milk is rapidly brought to the boil, whilst the boiler can conveniently be used from either a lampholder or a power plug. Made of pure aluminium, the boiler is designed to permit of absolute cleanliness, with the minimum of

labour. The container is perfectly smooth and polished, and there are no nooks and crannies where stale milk can collect. The boiler is so designed that it cannot boil over; the milk, when it boils, rises through the centre of the special inside lid and falls back through the holes. In pouring, too, the special rim prevents dripping and

Fig. 2.—The " Inventum " Milk Boiler.

wastage. This new " Inventum " appliance can be seen demonstrated at the showrooms of Mr. Alan Wright, Victoria House, 117, Victoria Street, S.W.1.

Old-oak Table Lamps.

The British Legion Disabled Men's Industries (Sales), Ltd., 20, Buckingham Palace Road, is making old-oak standard table lamps in sizes varying from 12 in. to 15 in. overall. The lampholders are finished in oxidised bronze or silver as required.

The genuine antiquity of the oak is guaranteed by the fact that the wood has been obtained from the roof of Westminster Hall, which was erected in 1398, during the reign of King Richard II. The wood was removed owing to the ravages of the death-watch beetle larvæ, but the portions used are claimed to be quite sound.

Hand-painted Table Lamps and Shades.

Electric Art Shades (1928), Ltd., Kelvedon, Essex, have recently introduced a very attractive and artistic range of " Electa " hand-painted parchment lamp shades of which those depicted in fig. 3 are a selection. The shades can be supplied suitable for 9-in. pendant and reversible gimbal, 12-in. pendant, and 18-in. duplex fittings.

Another " Electa " development is a range of table lamps of Royal Stanley jacobean ware in which the

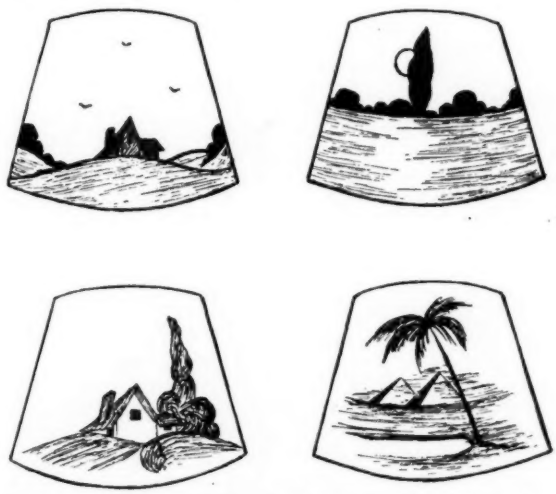


Fig. 3.—" Electa " Hand-painted Parchment Shades.

shades represent excellent British workmanship and finish, and are beautifully hand painted in designs to match the porcelain standards. Each table lamp is supplied with three yards of flexible cord, a push-bar switch lampholder, a standard plug or adaptor, and a tilting parchment shade.

Domestic Lighting Fittings.

Among a range of " Efteelite " domestic lighting fittings marketed by Messrs. Fredk. Thomas & Co., Ltd., 189 & 191, Drummond Street, Hampstead Road, N.W.1, we have selected for illustration Fittings Nos. A606 and A607, figs. 4 and 5, respectively.

Fitting A606 is designed for use in the kitchen. It is 10 in. in diameter, and is suitable for a 100-W lamp. No. A607, which is 6 in. in diameter and takes a 60-W lamp, is intended for bathroom use. In

Figs. 4 and 5.— " Efteelite " Kitchen and Bathroom Lighting Units.

both fittings the metalwork is substantial and finished in cellulose enamel, and the glassware is of good quality and designed to give high lighting efficiency.

New Refrigerators.

Among a range of new " Busy Bee " electric automatic refrigerators recently introduced by Messrs. Drake and Gorham Wholesale, Ltd., 77, Long Acre, W.C.2, is the model " H " domestic apparatus, fig. 6. The outside and inside dimensions of this model are, respectively: width, 31½ in. and 26⅜ in.; height, 65 in. and 36¼ in.; and depth, 21⅝ in. and 17¾ in. There is a total shelf area of 10¾ sq. ft., and the available food space is 7¾ cu. ft. Two ice trays accommodate 18 cubes each, and a dessert tray has an ice capacity of 6½ lb. The interior is finished in white porcelain and the exterior in white " Duco " lacquer. The compressor unit is served by a ¼-h.p. motor which can be supplied for standard voltages from 100 to 250, a.c. or d.c. Three other " Busy Bee " refrigerators included in the range are the " Junior," model M and model G, having food

Fig. 6.—" Busy Bee " Domestic Refrigerator.

spaces of 5¼, 21 and 53 cu. ft., respectively. The rotary compressor in each unit, with only three moving parts, is claimed to have very high efficiency and a smooth action. Other features of these refrigerators are: all moving parts in an oil bath; no vibration; refrigerant neither explosive nor poisonous; no water cooling; no brine; and pressure control.

Hire and Hire-purchase.

An investigation into the economic aspects of the extension of hire and hire-purchase facilities by electricity supply undertakings.

By A. W. WILLSMORE, F.R.Econ.S.

IF it is a sound business policy to sell a man his house on an instalment-payment basis, then it is equally sound to let him have his household fittings and equipment on similar terms. That seems to be the general thought behind the rapid development of instalment trading in this country during the past few years, and it must be admitted that in spite of the gloomy predictions from certain quarters as to the effect on hire-purchase of a business slump, the system is still a popular element of retail trading. In fact, it is generally admitted that, provided the goods in question are durable and have a certain re-sale value, the hire-purchase system is quite sound.

The report of the Committee appointed by the Electricity Commissioners to consider the question of instalment selling has now been published.* It is not surprising to find that the Committee warmly recommends the widespread adoption of arrangements to enable potential consumers of electricity to obtain on easy terms the necessary fittings and consuming appliances for the use of electricity. In considering the report, however, it is necessary to distinguish between three different types of instalment trading, *viz.*, deferred-payment systems, hire systems, and hire-purchase systems.

The deferred-payment system which is proposed by the Committee for the disposal of wiring and fittings is legally the same as an outright sale, and as such we are not interested in the scheme from the point of view adopted in this article. Actually, the consumer buys the installation when he signs the agreement, but the supply authority allows him to spread his payments over a period. If the consumer leaves the premises without being able to reach an understanding with the succeeding tenant, he is liable to repay the whole of the balance of the cost of the fittings. If the installation were being sold on hire-purchase terms, however, the consumer would be able to terminate the agreement at any time without further obligation (subject to any clause to the contrary in the agreement).

So far as the hire and hire-purchase of electrical appliances is concerned, the general conclusion of the Committee is that authorised undertakers should be urged to offer such facilities to their customers as a means of increasing the sale of electricity. The question arises, should the consumers be offered the alternative of hire and hire-purchase systems, or should they be restricted to one or other of the systems, and if so, which?

From the supply undertaking's point of view, the chief difference between hire and hire-purchase systems lies in the duration of the investment. If goods are sold on hire-purchase terms, the investment in each agreement is definitely limited, and is, moreover, on a declining scale. Furthermore, arrangements can be made with finance companies to relieve the supply undertaking of the investment involved in the agreements. Where the appliances are let out on hire, a permanent investment is involved, and one which the supply undertaking must carry itself. A steady annual charge is also involved for keeping the appliances in good repair. If this investment is to be justifiable, there must be a reasonable relationship between the amount of money involved and the increased sale of energy resulting from the hire. This relationship also has a bearing on the extent to which the supply undertaking should embark on retail trading by offering hire-purchase facilities for equipment.

The Committee is of the opinion that heavy-current-consuming apparatus should be available for hire or hire-purchase, and that other apparatus with a low current consumption should be available for hire-purchase only. This ratio between the cost of the appliance and the amount of energy it would consume is not the only factor, but it is perhaps the most important consideration. It is difficult to arrive at this cost-consumption ratio since it obviously varies for different types of the same appliance and depends on the habits of the user. The following is a rough approximation of the ratio for several domestic appliances, the calculation being based on the assumption that electricity is charged at 1d. per kWh:—

Appliance.	Consumption per annum.	Cost.	Time taken to consume energy of equal value to cost.
Fire	720 kWh	£3	1 year
Kettle	400 ,,	£2	1.2 years
Cooker	1,800 ,,	£18	2.4 ,,
Water heater ...	800 ,,	£8	2.4 ,,
Iron	70 ,,	16s. 6d.	2.8 ,,
Wash boiler ...	450 ,,	£7	3.7 ,,
Toaster	50 ,,	£1	4.8 ,,
Refrigerator ...	400 ,,	£30	18 ,,
Vacuum cleaner	50 ,,	£12	58 ,,
Washing machine	50 ,,	£30	144 ,,

In general, hire-purchase should be confined to appliances that do not take longer than three years to consume their cost in energy. Further, if the only end which the supply undertaking has in view is the increasing of its yearly sales of energy, it is doubtful whether there is justification for pushing hire-purchase facilities for appliances that do not consume more than, say, 200 kWh a year. It is appreciated that low-current-consuming appliances give a very valuable service to consumers, and we do not suggest that the supply undertaking should maintain silence on the virtues of these appliances. The actual sale of such appliances, however, is probably best left in the hands of electrical retailers.

In addition to the amount of energy consumed per annum by the particular appliance, attention must be paid to the nature of the increase in load. Water heaters for night operation are very valuable in providing an off-peak load, and this factor must be taken into consideration in deciding whether there is sufficient advantage to justify the investment in appliances on hire. The electric cooker is the most usual article hired out by the supply undertakings. It will be seen above that the cooker consumes its cost in energy inside 2½ years. In addition, it provides a very desirable addition to the load particularly in residential districts, and by virtue of its high diversity factor, some 1,000 kW of cookers can be carried by 100 to 110 kW of generating plant. Considerations such as these must also be taken into account in calculating hire charges. It is not sufficient to base these charges simply on cost and maintenance estimates; the revenue-earning capacity of the appliance must be allowed for as well as the value of the service to the consumer, competition from gas, coke and coal, and, of course, the nature of the load involved.

* The report is reviewed elsewhere in this issue.

With regard to the question of hire-purchase as distinct from hire, the scheme outlined in the appendix to the Committee's report seems very suitable for the disposal of domestic appliances. It is a debatable point whether the interest charge of 5 per cent. is sufficient to cover all the risks and charges involved, in spite of the fact that this 5 per cent. represents a charge of approximately 10 per cent. on the average balance outstanding. The first payment of 10 per cent. of the value of the appliance is also low, and probably does not cover the initial depreciation of the appliance. This latter point is satisfactorily covered in the specimen agreement by the inclusion of a clause ensuring the company of six months' rent before the agreement can be terminated by the hirer, and if a satisfactory increase in the sale of energy results, the low interest figure will probably be found to be sufficient cover.

In all, the proposals of the Committee seem to be quite sound, and designed to increase the domestic use of electricity. But the question of collaboration between the electricity supply undertakings on the one side and manufacturers, contractors, and retailers on the other, will need carefully watching to avoid as far as possible any antagonism that might result from the supply company taking over the functions of these other concerns.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures.

Economic Mission to the Far East.

Last week Mr. Gillett, Parliamentary Secretary to the Department of Overseas Trade, announced the personnel of the Economic Mission which the Government, upon the recommendation of the Overseas Trade Development Council, is sending to the Far East. The members are Sir Ernest Thompson, chairman (representing the cotton industry), Sir Thomas Allen (director, Co-operative Wholesale Society), Mr. James Bell (representing textile trade unions), Mr. W. A. Crowther (woollen industry), Lt.-Col. R. K. Morcom (Belliss & Morcom, Ltd., and former chairman of the B.E.A.M.A. Council), and Mr. Louis Beale (Special Commissioner to the Overseas Trade Development Council). In addition to the main Mission there is a Cotton Sub-Mission of which Sir Ernest Thompson is also chairman. The Mission will leave England towards the end of September and will visit, among other places, Nanking, Shanghai, Hankow, Northern China, Manchuria and the Canton district, and will be absent for about six months; Japan will also be visited. The Mission will study the present position of British trade, the methods of trading and manufacture now in use, transport and marketing, the tastes and preferences of customers, and all questions affecting the sale of British goods in the Far East. It will consider what recommendations can be made for the improvement of British trade and the stimulation of British exports to the Far East. Mr. Gillett said that it was the policy of the Overseas Trade Development Council to make abundantly sure that reports of Economic Missions were discussed in detail with the trades concerned and that plans were devised to give practical effect to any recommendations that might be made by those Missions. One of the great benefits arising from this policy was that British industries learnt at first hand what they must do not only to retain but to develop their trade with foreign countries.

The F.B.I. Quarterly Review.

The "Business Barometer" of the Federation of British Industries for the third quarter of 1930 continues the study of remedies for trade depression. It is shown that while in the pre-war period 70 per cent. of our savings flowed into new productive enterprise and only 30 per cent. into mortgages, debentures and charges on past investment, since the war the position has been reversed. It is suggested that one way of restoring the pre-war conditions is by the granting of foreign loans with the express condition that a substantial proportion will be expended directly on British goods or in facilitating British emigration.

The forecast for the third quarter of the year says that the end of the international trade depression is not yet in sight, but we cannot be very far from the bottom. By comparison with other countries British trade has held up surprisingly well, though, having regard to the disorganisation which the fall in prices of primary products has occasioned in the raw material and food producing areas of the world, our export activities have been seriously curtailed. Owing to the magnitude of her raw material commitments, the United States continues to exercise a dominating influence on the prices of many important raw materials, and, while it is quite possible for international trade to revive without American participation or price stability, a condition of maladjustment in that country cannot fail to have a delaying effect.

Mexico as an Electrical Market.

A message to *Reuter's Trade Service* from Mexico City says that the steady growth of local manufacturing and the many irrigation projects of the Federal Government have drawn the attention of manufacturers of electrical plant and apparatus to opportunities offering in Mexico. The demand for electricity increased during the first half of this year by 13 per cent. as compared with last year. Preliminary results of the recent census give the population of the Federal District as 1,217,000, an increase of 517,000 since 1925. Owners of apartment houses are now being compelled to install and maintain distribution lines between their buildings and the street circuits, and provide connections within the buildings to individual meters or switches. On the larger plantations and ranches more use is being made of self-contained lighting plants, and many more manufacturers in the capital and provincial towns are willing to use electricity where it can be provided at moderate rates. The annual consumption of electricity during the period 1921-29 is estimated to have increased from 370,000,000 to 620,000,000 kWh.

Dutch Radio and Lamp Exports.

According to the official returns of the Dutch Customs authorities, the exports of radio apparatus and accessories from Holland in June experienced a large decline both in weight and value as compared with the previous month, and a very considerable diminution as compared with June, 1929. For the first half of 1930, however, the exports amounted to 4,855 tons as against 4,615 tons in the corresponding period in last year, while the value decreased from 39,142,000 fl. to 31,307,000 fl. The exports of incandescent lamps in June were greater in quantity and value than in the previous month or in the corresponding month of 1929. But for the first half of this year the number exported was 22,736,600 as compared with 31,331,900 in the first half of 1929, while the value was 10,178,000 fl. as compared with 14,563,000 fl.

German Activity in Czecho-Slovakia.

The formation has taken place at Prague, under the title of the Elektrotechna, of a new company to take over the "low-tension" interests of the Siemens and Halske Company in that country, including the Karlin works and the Zenit radio works in Prelouc. The share capital is 16,000,000 Czech crowns, of which the German company holds 49 per cent.

New E.T.U. Headquarters.

The general offices of the Electrical Trades Union were recently removed from Manchester to 11, Macaulay Road, Clapham Common, London, S.W.4.

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New Overseas Trade Appointments.

It was announced by Mr. G. M. Gillett, Parliamentary Secretary to the D.O.T., in March last that it was proposed to create eight new posts in the Commercial Diplomatic Service and two new Trade Commissioner posts. Applications were invited both from men in the Government service and those outside it and over 1,100 applications were sent in. As a result of careful scrutiny first by the Civil Service Commissioners, who passed the names of 70 candidates to a special selection board, the following appointments have been made, subject in some cases to the issue of certificates of qualification by the Civil Service Commissioners:—Argentina: Commercial Secretary, Grade 2 (additional appointment), Mr. R. K. Jopson, M.B.E. (Vice-Consul at Montevideo); Brazil: Commercial Secretary, Grade 2 (additional appointment), Mr. J. G. Lomax, M.B.E. (Vice-Consul at Bogotà); China (for service in Manchuria): Commercial Secretary, Grade 2, Mr. J. C. Hutchinson, O.B.E. (a Vice-Consul in China); Colombia: Commercial Secretary, Grade 2, Mr. T. J. Anderson (Consul at Maracaibo); Egypt: Commercial Secretary, Grade 2 (additional appointment), Mr. L. B. S. Larkins (chief clerk to the Commercial Secretary at Cairo); Finland: Commercial Secretary, Grade 2, Mr. C. B. Jerram (Consul at Tallinn); Persia: Commercial Secretary, Grade 2, Mr. E. R. Lingeman (a Vice-Consul at Tehran); Switzerland: Commercial Secretary, Grade 2, Mr. F. J. Molloy (of the London and Scottish Assurance Corporation, Ltd.); Montreal: Trade Commissioner, Grade 2 (additional appointment), Mr. H. F. Gurney (assistant to the Trade Commissioner at Vancouver); and Durban: Trade Commissioner, Grade 2, Mr. S. R. Jordan (Vice-Consul at Durazzo).

Power Plant in Rumania.

Information received by the Department of Overseas Trade from the Commercial Secretary's office, Bucarest, shows that at the end of 1929 there was 1,133,776 h.p. of prime movers in operation in Rumania. The generating plant had a total capacity of 331,229 h.p. (235,229 h.p. a.c.), and 11,099 electric motors with a total rating of 178,915 h.p.

Bosch Sparking Plug Manufacture in Australia.

The Australian Press states that the Bosch Company in Australia has supplied machinery from Germany for the manufacture of sparking plugs at Abbotsford, near Melbourne.

Australian Radio Manufacturers' Protest.

According to the *Sydney Morning Herald*, Mr. F. Edwards, Secretary of the Chamber of Manufacturers, made a strong protest recently against the ordering of radio apparatus abroad by the Commonwealth Postmaster-General. Mr. Edwards said that, while the importation of radio receiving apparatus into Australia had been banned, there was no restriction on transmitting apparatus. Although Australian manufacturers had been able to supply similar apparatus to the New Zealand Government against world competition, the Postmaster-General had sent orders abroad for over £200,000 worth of apparatus. The Australian radio manufacturers were spending more than £10,000 a year upon research and were capable of producing all the apparatus essential to the commercial radio services throughout Australia and the Pacific. In spite of this they were not given a chance to quote for the five broadcasting relay stations which were the subject of the present orders.

The Australian Import Ban.

It is announced in connection with the prohibition of the importation of certain classes of goods into Australia that certain exemptions have been made by the Customs authorities. These include the elements of electric cooking and heating appliances and motor-cycle batteries.

Crompton Parkinson's New Departure.

The announcement made last week by Messrs. Crompton Parkinson, Ltd., that they had entered the incandescent lamp manufacturing industry by the purchase of the business of the Nox Electric Lamp Co., Ltd., came as a surprise to the trade. The Nox Electric Lamp Co., Ltd., was formed just over seven years ago, taking over an existing business; its factory is in Leeds.

Germany's Electrical Imports and Exports.

The imports of electrical machinery and apparatus into Germany during the five months ended with May last attained a value of £907,750, as compared with £1,037,550 in the corresponding period of 1929. The exports of similar material from Germany reached a total of £12,060,350, against £11,328,950.

Swedish Foreign Electrical Trade.

Returns just to hand show that the value of the electrical machinery imported into Sweden during May last attained a total of £107,189, bringing up the aggregate for the first five months of the year to £550,590, as compared with £399,490 in the corresponding period of 1929. The exports of electrical machinery from Sweden during May reached a value of £333,140, bringing up the total for the year to date to £1,327,055, as compared with £1,162,430 in the corresponding period of last year.

New Belgian Company.

With the title La Société des Forces Hydro-électriques de Sanga and a capital of 60 million fr. (about £340,000), a company has been formed in Brussels to establish a hydro-electric station to utilise the power of the Sanga falls on the Inkisi river, Belgian Congo.

Local Exhibitions.

The Guildford Corporation Electricity Committee has authorised the borough electrical engineer to arrange a series of electrical exhibitions to be held in the autumn in Guildford, Peaslake, Shere and Worplesdon, at an approximate cost of £300.

The B.E.A.M.A. Trade Survey.

The British Electrical and Allied Manufacturers' Association was to publish yesterday the sixth of its trade surveys (10s. 6d. net). This covers the period of eighteen months ended with June last and makes a tentative forecast for the current year and 1931. We propose to deal with the publication in our next issue.

Hydro-electric Development in Uruguay.

Rapid development of the electric light and power industry in Uruguay is offering opportunities for foreign firms to compete in surveying and in the supply of equipment. A number of German, French, and American firms are already in the field, but, according to the latest review of business conditions in Latin America, issued by the Royal Bank of Canada, no British firm appears to have taken action. The utilisation of the waters of the rivers Negro, Uruguay, and Quequay for the development of electrical energy had been contemplated for some years, the available power being put at 300,000 h.p. Two years ago a European engineer was employed to survey the Rio Negro, and Congress provided 100,000 pesos for similar studies of the other rivers. Authority was also given to appoint a commission of engineers to prepare a basis for tenders and a list of competent firms. In March last year one American, one French and four German firms were selected and started their surveys. Bids for the work were not limited to these competitors, but prizes have been offered for their bids amounting to $61,200, United States currency.

To Western Canada *via* the Panama Canal.

The Trade Commissioner at Vancouver has prepared for the Board of Trade a "Report on the Influence of the Panama Canal on Trade with Western Canada." In the course of this he says that so far as distribution of merchandise in Western Canada is concerned, the use of the Canal route continues often to be most profitable as compared with shipment *via* Eastern Canadian ports, but the tendency has been to lower rates by both routes, especially overland, and the advantage of the long sea route is not quite so pronounced as in 1924; yet it remains considerable. Particulars of the steamship lines serving Vancouver and their agents, with particulars and comparisons of freight rates, are included in the report.

The Brazilian Battery Market.

A confidential report on the market for primary and secondary batteries in Brazil has been prepared by the Department of Overseas Trade from information furnished by the Commercial Secretary at Rio de Janeiro and issued to firms whose names are entered on its special register. United Kingdom firms desirous of receiving a copy of this report should communicate with the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1, quoting reference No. A.X. 9919.

Czecho-Slovakian Electrical Imports.

During June electrical machinery and apparatus valued at 21,000,000 cr. (£128,000) was imported into Czecho-Slovakia, making the total for the first half of the year 153 million cr. (£933,000).

The E.D.A. August Programme.

The August programme of the British Electrical Development Association, Inc., draws particular attention to the E.D.A.-E.L.M.A. Shop and Display Lighting Campaign which will be the Association's major activity during the autumn and early winter. The objects of the campaign are briefly referred to, and details of local and national activities are included. The suggested window displays for the month advance the claims of electric fans for specialised display schemes, and particulars of materials required for these schemes are given. Posters and literature for the month, published by the Association, draw attention to electric cookers and fans, and a price list is given for various quantities. Suggested advertisements for insertion in the local Press also feature electric cookers and fans, and the programme concludes with notes by the Director.

Electrical Display in a Carnival.

The chief engineer and manager of the Cannock U.D.C. Electricity Department (Mr. P. Wardle) has sent us a photograph of a tableau entered by his department in a carnival held at Hednesford recently. This contrasted ancient and modern (electrical) methods of cooking and a racy touch was given to the display by a picture on the side of the vehicle showing a horse passing the winning post, with the legend "Electricity is a 'Dead Cert.'"

American Activities in Hungary.

Negotiations are reported to be approaching a conclusion which aim at the establishment of a close connection of interests between the American General Electric Co. and the Ganz Electricity Co. of Budapest. It is said that the former will acquire one-third of the shares in the Ganz Co. and that in this connection there will be an increase in the latter's share capital. The question as to the extent to which the patents of the American company will be placed at the disposal of the Ganz Co. is still an open matter.

Transformers for the Grampian Scheme.

An interesting shipment recently from the Rugby works of the British Thomson-Houston Co., Ltd., included 20,000-kVA, 132,000/11,000-V transformers supplied to Messrs. Balfour,

A B.T.-H. Transformer for the Grampian Scheme.

Beatty & Co., Ltd., for the Grampian Electricity Supply Co. The accompanying illustration shows a special 60-ton wagon bearing one of these transformers, weighing 57 tons as arranged for transport, the weight complete being 67 tons and the quantity of oil required 5,360 gallons. These transformers will be used with the water-turbine driven B.T.H. alternators at Rannock power station and will feed the National Grid through B.T.H. transformers at Abernethy.

Continental Wire Convention.

It is stated that the European producers of electrical conductor wires have entered into an arrangement under which they have agreed mutually to respect each other's markets. It is therefore expected that the keen competition which has recently been prevalent will now cease, especially as syndicates for the home business exist in individual countries. A similar understanding already rules in the cable branch where the firms concerned enter into a special price arrangement in the case of foreign contracts.

Social Events.

The Sports Club of Siemens Lamp Works, Preston, has recently concluded some further events in its annual series of competitions. These popular competitions are held in the grounds of the Dick Kerr Club at Ashton Park. The "S. H. Callow" golf prize (18 holes medal play) was taken by Mr. W. Higginson with Mr. P. D. Oakley second, and Mr. W. T. Le Marechal, Junr., third. An eclectic competition was selected for the "W. O. Smith" golf prize, Mr. W. G. Creasy leading; Messrs. W. Higginson and J. Sharp tied for second place. In the doubles bowls competition a very close final resulted in a win for Messrs. T. Jones and A. Facer, who defeated Messrs. J. Park and W. Seddon, whilst in the singles bowls, Mr. F. Woods (received 3) won by 15 points to nil against Mr. T. Wood (owed 1), the other semi-finalists being Messrs. A. Facer and W. Marsh.

German Radio Exhibition.

The annual German Radio Exhibition is to be held in Berlin from August 22nd to 31st next. This year the show will include a section for gramophones and records.

United States Electrical Exports.

The United States statistics of electrical exports for May last show that the total value was $11,653,007 as compared with $11,008,197 in May, 1929. There was a number of wide variations in the individual items. The increases included the following: Power and distribution transformers, from $179,098 to $713,520; flash-light batteries, from $249,131 to $350,284; switchboard panels, from $58,131 to $146,193; switches and circuit-breakers, over 10 A, from $136,074 to $288,814; electrical indicating instruments, from $41,205 to $100,993; stationary motors, from 1 to 200 h.p., from $237,259 to $342,474; mining and industrial locomotives, from $13,341 to $129,539; and electric fans, from $98,534 to $147,631. Among the principal decreases were the following: Telephone apparatus, from $630,150 to $519,000; bare copper wire, from $393,095 to $215,043; insulated copper wire, from $468,618 to $406,204; flashlight cases, from $222,903 to $19,022; steam turbo-generator sets, from $108,551 to $31,797; self-contained lighting sets, from $106,748 to $37,201; and rectifiers, convertors, &c., from $143,704 to $87,564. Canada's share of the trade was valued at $2,864,116 and Russia with $1,024,130 was the second most important purchaser. The next in order were Argentina ($785,955), the United Kingdom ($770,480 against $668,947 in May, 1929), Mexico ($656,659), Italy ($416,121), and Brazil ($410,336). Prominent in the shipments to the United Kingdom were refrigerators, fractional h.p. motors, furnace electrodes and insulating material. The electrical imports of the United States during May amounted to only $278,652.

New Zealand Tariff Revision.

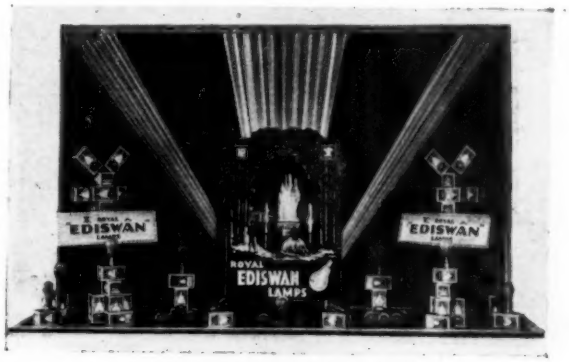
We have already reported that the revised New Zealand Customs tariff imposes increased duties upon a number of classes of goods under the "general" rate of duty while leaving the British preferential rate unaltered, thus giving an increased measure of preference to British goods. The *Board of Trade Journal* for July 31st contains details of the revised duties, and from these it is seen that the general duty on generators, transformers, convertors, motors, switchboards, switch- and fuse-gear, carbons, locomotives, cables and other electrical machinery and apparatus has been increased by 5 per cent. *ad valorem*, raising the rate to 25 per cent. British products in these categories are still admitted duty-free. A similar increase has been made in the cases of wireless broadcasting receiving sets mounted in cabinets, and electric lamps, n.e.i. (not being peculiar to surgical use), increasing the duty to 38 per cent. *ad valorem*, the British preferential duty remaining at 10 per cent. The summary also gives details of new specific duties on "electric lamp bulbs," ranging in the case of foreign products from 2½d. each for bulbs not exceeding 8-W consumption to 1s. 3d. for bulbs up to 180 W, and 7½d. per 100 W thereafter. The corresponding British preferential rates are 1d., 6d., and 3d. The new duty on foreign electrical insulators is 50 per cent. *ad valorem* (British preferential rate 25 per cent.), and that on electric cooking and heating appliances 45 per cent. (British preferential rate 20 per cent.).

The Industrial Designs Competition.

The Royal Society of Arts has published the results of its seventh annual open Competition of Industrial Designs. In the Advertising Section this year the British Electrical Development Association offered a prize of £25 for a design for a poster advertising the uses of electricity in rural districts. The judges decided to divide this prize and awarded £15 to Mr. C. D. Morgan (Liverpool School of Art) and £10 to Mr. J. F. Lawrie (Bournemouth School of Art). A prize of £25 presented by Messrs. W. T. Henley's Telegraph Works Co., Ltd., for a poster design advertising the "Henley Wiring System," was awarded to Mr. J. E. Tindall. Of a prize of £30 put up by Celestion, Ltd., the judges decided to award half to Mr. E. Fancott (Liverpool School of Art), and seven guineas of a prize of £25 offered by Messrs. E. K. Cole, Ltd., was awarded to Mr. E. L. Fisher (L.C.C. Camberwell School of Arts and Crafts).

An Ediswan Lamp Window Display.

In the accompanying illustration we show a new Royal Ediswan lamp window display which has been prepared by the Edison Swan Electric Co., Ltd., as a sales aid to electrical



An Ediswan Lamp Display.

dealers. The centre piece is particularly attractive as it features an electric fountain illuminated from the rear by a special arrangement which introduces a pleasing series of gradual colour changes. Electrical contractors and dealers can have their windows professionally dressed with this display on application to the local Ediswan representative.

Unemployment.

The Ministry of Labour returns show an increase of 32,834 in the number of the registered unemployed on July 21st. At that date the total was 1,972,700, as compared with 1,930,866 on July 14th, and 1,122,643 on July 22nd, 1929.

Bankruptcy Proceedings.

F. M. Crane, electrician, trading as C. S. Mayfield & Co., and the Sutton Electrical Installation Co., 67, Carshalton Road, Carshalton, and 38, Brighton Road, Sutton.—The receiving order in this case was made on the debtor's own petition on July 16th. The statement of affairs shows ranking liabilities of £294, and net assets of £92, leaving a deficiency of £202. The debtor attributed his failure to lack of capital, bad trade and heavy overhead charges.

G. E. Spero (Truphonic Wireless Co.), wireless apparatus manufacturer, &c., 121-123, Rosebery Avenue, E.C.1.—Receiving order made July 24th on a creditor's petition. First meeting held August 6th. Public examination October 7th, at Bankruptcy Buildings, Carey Street, W.C.2.

T. S. Hanson, electrical contractor, 26, Nether Hall Road, Doncaster.—The public examination herein which was to have been held at the County Court Hall, Bank Street, Sheffield, recently, was adjourned. The statement of affairs presented showed liabilities of £1,572 and assets of £814.

W. T. Monk, electrical engineer, 9, Rosedale Road, Romford.—First meeting held August 5th, at 29, Russell Square, W.C.1, and public examination August 6th, at the Shire Hall, Chelmsford.

R. Dring, electrical engineer, 257, Freeman Street, Great Grimsby.—Trustee, Mr. C. Turner, 155, Norfolk Street, Sheffield, appointed July 25th.

H. A. Kaplan, wireless dealer, 89, Elgin Mansions, Elgin Avenue, W.9.—Receiving order made July 29th on a creditor's petition. First meeting, August 12th, and public examination October 16th, both at Bankruptcy Buildings, Carey Street, W.C.2.

T. J. Horn (T. Horn & Co.), electrician, 5, Harrogate Parade, Moortown, Leeds.—First meeting, August 14th, at the Official Receiver's Office, 24, Lower Bond Street, Leeds. Public examination, September 23rd, at the County Court House, Albion Place, Leeds.

M. Baynes (Langham Radio), wireless manufacturer, "Polkirt," Nightingale Lane, Chalfont St. Giles, Buckingham. —Discharge suspended until January 4th, 1932.

Company Liquidations.

D. A. Jones, Ltd., radio manufacturers, Emerald Street, Theobalds Road, W.C.—A meeting of creditors was held on July 28th, when Mr. D. A. Jones, a director, occupied the chair. A statement of affairs was submitted showing liabilities of £11,720 and net assets of £4,492. The deficiency as regarded the creditors was thus £6,728 whilst as regarded the shareholders there was a deficiency of £7,228. The company was formed in 1927, under the style of Lichtenberg & Jones, Ltd., with a nominal capital of £1,000. Shares to the value of £500 were issued for cash to Mr. Jones, who also provided a loan of £1,400. Mr. Lichtenberg did not subscribe anything for shares. Additional capital was obtained by means of an overdraft of £550. The name of the company was changed to D. A. Jones, Ltd., last year. The present position was attributed to the difficulty in making sufficient profit on a falling market to cover overhead expenses. No interest had been paid or charged upon the loans made to the company by the directors and their friends. A resolution was passed confirming the voluntary liquidation of the company with the nominee of the shareholders as liquidator and a committee was appointed consisting of the representatives of the Tungsram Electric Lamp Works (Great Britain), Ltd., B. Lewis & Co., and the bank. The principal creditors are:—

	£		£
Newberger & Co.	148	Suplis, Ltd.	303
Tungsram Electric Lamp Works (Great Britain), Ltd.	324	Star Accumulator Co. ...	187
		B. Lewis & Co.	174
		A. Weber & Co.	104

Wireless Pictures (1928), Ltd.—A resolution for the voluntary winding-up of the company was passed at an extraordinary general meeting on July 31st, and at a meeting of creditors on August 1st the liquidation of the company, with Mr. J. S. Bird, 14, Regent Street, S.W., as liquidator, was approved. The following are creditors:—

	£		£
Bird, J. S.	280	General Electric Co., Ltd.	103
Bright, Sir Charles ...	160	Guest, Capt. F. E. ...	481
Burndept Wireless, Ltd.	90	Grattan-Doyle, Sir N.	335
British Broadcasting Corpn.	625	Judge, Hackman, Meyer and Judge	157
Boult, Wade & Tennant	406	Kingston & Lynes ...	194
Beaconsfield Trust, Ltd.	267	Loufte, W.	150
Central Press Photos, Ltd.	503	Lynas, W. H.	335
Dorland Advertising Co.	1,475	Postmaster-General ...	208
Deloitte, Plender, Griffiths & Co. ...	375	Plessey Co., Ltd. ...	130
Eden Fisher & Co., Ltd.	81	Robinson, Dr. J. ...	433
Fulton, Capt. Otho ...	1,265	Schenkers, Ltd.	175
		Simpson, Lt.-Col. A. ...	696

Transmutograph, Ltd., 44-46, Kingsway, W.C.2.—A meeting of the creditors was held on July 31st. Prior to the meeting the shareholders had passed a resolution nominating Mr. Shay, of Messrs. Keens, Shay, Keens & Co., as liquidator. A statement of affairs submitted disclosed liabilities of £12,667, all due to unsecured creditors, and the net assets of £4,227, leaving an estimated deficiency, subject to the costs of liquidation, of £8,440. It was stated that a scheme had been formulated whereby a new company was to be formed and deferred shares would be offered to the shareholders and the old creditors. The scheme would, in effect, be that the creditors would be offered one share for each pound which they claimed against the old company. If the company was wound up in the ordinary way, the creditors could not hope to receive a dividend, as there was a claim against the company for £10,000, and that creditor was also in possession of the patents. A resolution was passed confirming the appointment of Mr. Shay as liquidator.

Truphonic Radio, Ltd.—First meetings of creditors and contributories August 8th, at Bankruptcy Buildings (Room 53), Carey Street, Lincoln's Inn, W.C.2.

Edson Engineering Co., Ltd.—Winding up voluntarily. Liquidator, Mr. E. E. Mills, 65, Chancery Lane, W.C.2.

Premier Electric Co. (Stockport), Ltd.—Winding up voluntarily. Liquidator, Mr. W. Chaloner, 12, St. Peter's Square, Stockport. Particulars of claims to the liquidator by September 7th.

Epoch Electrical Society, Ltd.—A meeting of members is called for August 28th, at 24 and 25, Ironmonger Lane, E.C.2, to hear an account of the winding up of the company by the liquidator, Mr. C. T. Hughes.

Grosvenor Battery Co., Ltd.—Winding up voluntarily. Liquidator, Mr. F. H. C. Christmas, 46-47, London Wall, E.C.2.

Engineers (Penge), Ltd.—Winding up voluntarily. Liquidator, Mr. F. H. Briggs, Kenwyn Lodge, Torquay. Particulars of claims to the liquidator by August 18th.

Branson Kent & Co., Ltd.—Particulars of claims by September 6th to the liquidator, Mr. T. V. B. Wilmhurst, 110, Cannon Street, E.C.4.

Howard Snell & Co., Ltd.—A meeting of members is called for September 3rd to hear an account of the winding up of the company by the liquidator, Mr. R. W. West.

Foundation Co., Ltd.—Meetings of creditors and contributories August 21st, at the Kingsway Hall, Kingsway, W.C.2.

Book Notices.

"Men's Lives," by Robert C. Rodgers (28 pp.). Birmingham: E. C. Osborne, Ltd. Price 1s. 6d. net.—In this monograph the author, a past-president of the Birmingham Chamber of Commerce and a former chairman of the Birmingham Section of the British Industries Fair, reviews the causes of unemployment in this country and suggests methods of improving the position. In the first place he advocates that British purchasers should buy British goods and he then goes on to deal with the many handicaps under which our manufacturing industries labour and shows how our competitors are aided by our fiscal and monetary systems. His conclusion is that "a new fiscal policy and a reconsideration of our money policy is essential to compel our competitors to send us less and make us produce more, for only the production of goods can bring work and prosperity."

"British Railways and Unemployment," by E. R. B. Roberts (65 pp.). London: Industrial Transport Publications, Ltd. Price 1s.—The author of this little book endeavours to show how the unemployment problem could be solved, or, at least, alleviated, by the abolition of the private ownership of railway wagons in favour of ownership by the railway companies, by the general use of 20- and 40-ton all-steel trucks, by the erection of steel coal-storage deposits by the collieries and railway companies, by a drastic revision of rates on agricultural traffic and a reduction of passenger fares.

"Economic Conditions in Turkey," by Col. H. Woods, O.B.E., Commercial Secretary at the British Embassy, Istanbul (Constantinople). Stationery Office, 1s. 9d. net.—This contains some useful information regarding conditions in modern Turkey but little of direct interest to electrical traders.

The "Henley Telegraph" Summer Number continues the history of W. T. Henley's Telegraph Works Co., Ltd., up to 1899, when the erection of the present North Woolwich works was completed. There are also some interesting and amusing articles and notes, particulars of staff changes, with a good number of pictures.

"Engineering Economics," second edition, by T. H. Burnham. Pp. xv+376; illustrated. London: Sir Isaac Pitman and Sons, Ltd. Price 10s. 6d. net.

"Science Abstracts (A and B)," Vol. XXXIII, July, 1930. London: E. & F. N. Spon, Ltd. Price 3s. 6d.

Trade Announcements.

Messrs. Taylor & Parsons, Ltd., Bond Street, Bradford, announce that in the remodelling of their premises the electrical wholesale department showroom has been enlarged.

The Marconiphone Co., Ltd., has appointed Mr. C. W. Tebb to its sales development department and Mr. H. J. Foyle will succeed him as the company's representative in Berkshire, Surrey, Oxfordshire, and part of Wiltshire. Mr. W. A. Rawlings will cover Mr. Foyle's present territory, S.E. London, in conjunction with S.W. London.

The Tungsram Electric Lamp Works (Gt. Britain), Ltd., is opening (on August 11th) new and larger premises at Tudor House, 34-38, Livery Street, Birmingham (Tel.: Central 7334).

The Wardle Engineering Co., Ltd., Old Trafford, Manchester, has been appointed sole distributor for Lancashire and Yorkshire of "Duro-Ray" British silvered shop window reflectors, and has issued an illustrated pamphlet containing particulars and prices of these reflectors.

The Metropolitan-Vickers Electrical Co., Ltd., has opened new offices in Manchester; the address on and after August 5th will be: Ship Canal House, King Street, Manchester (Telephone: City 6230-2; telegrams: "Multiphase, Manchester"). A new depôt has also been opened for the sale of "Cosmos" lamps at 3, Victoria Bridge, Manchester, to which address all correspondence connected with these lamps should be directed.

The Mersey Cable Works, Ltd., has appointed Messrs. S. T. Pemberton & Co., 8, Church Street, Colmore Row, Birmingham (telephone: Central, 5453) as its agents for the sale of "Mersey" cables in Birmingham and the Midland Counties.

Mr. P. H Smedley, manufacturers' agent and engineer, has removed from Leytonstone to 70, Whitehall Gardens, Chingford, E.4. (Telephone: Chingford 1940.)

New Catalogues and Lists.

Buck & Hickman, Ltd., 2, 4 and 6, Whitechapel Road, London, E.1.—A new edition of this company's general catalogue of small tools and supplies has just been published. It is excellently produced and illustrated and has been brought up-to-date in every respect. The book contains no fewer than 1,142 pages and is more comprehensive than the last edition, published in 1923. Many useful formulæ and tables are included, among them being English and metric weights and measures, conversion factors, decimal equivalents and all gauges in general use, formulæ for screw threads, British standard sizes of nuts and bolts, pipe flanges, and copper tubes.

Pratchitt Bros., Ltd., Denton Iron Works, Carlisle.—An illustrated brochure dealing with rotary furnaces, grinding and mixing machinery, drying stoves and tunnels, and miscellaneous chemical plant.

Chas. H. Champion & Co., Ltd., 14-17, Wells Street, London, W.1.—An interesting booklet entitled "High Intensity" on the subject of high-intensity illumination of kinematograph screens.

Hugh J. Scott & Co. (Belfast), Ltd., Volt Works, Ravenhill Avenue, Belfast.—Price list of the most popular types of electric motors for industrial machinery.

Burnley Components, Ltd., Rosegrove, Burnley.—Illustrated catalogue of "Burco" electric wash-boilers and water urns.

S. G. Brown, Ltd., North Acton.—The July "Brown Budget" gives details and illustrations of the forthcoming season's radio receivers and loud-speakers.

Brookhirst Switchgear, Ltd., Northgate Works, Chester.—Leaflet 321 describing the electrical control of machine tools.

Crompton Parkinson, Ltd., Guiseley.—A coloured booklet indicating the merits of the "Klosd" totally-enclosed, fan-cooled motor.

E. K. Cole, Ltd., "Ekco" Works, London Road, Leigh-on-Sea.—Advance programme for the 1930-31 season containing prices of the company's all-electric radio products, easy-payment terms, discounts, and particulars of the service offered to retailers.

British Vacuum Cleaner & Engineering Co., Ltd., London, S.W.6.—Various literature dealing with the new "Goblin Wizard" vacuum cleaner.

Best & Lloyd, Ltd., Handsworth, Birmingham.—Two excellent catalogues of lighting fittings have just been produced by this company. One (No. 171) contains illustrated details of a wide variety of "period" fittings, while the other (No. 172) is devoted to fittings of modern design. The prices of all models are given.

Calendar blotters for August have been received from Messrs. S. Rogers & Co., Ltd., 15, Fitzroy Street, W.1; Pitt & Scott, Ltd., 25, Cannon Street, E.C.4; Pope's Electric Lamp Co., Ltd., 5, Arthur Street, New Oxford Street, W.C.2; Jackson Electric Stove Co., Ltd., 143, Sloane Street, S.W.1; Mavor and Coulson, Ltd., 47, Broad Street, Glasgow.

Pope's Electric Lamp Co., Ltd., 5, Arthur Street, New Oxford Street, W.C.2.—Folder No. 5145, describing the complete range of "Elasta" lamps.

Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.1.—The August issue of "Radio" contains particulars, with illustrations, of events to be broadcast during the current month, with a radio station identification guide.

John Shaw & Sons, Wolverhampton, Ltd., Wolverhampton.—A folder containing exterior and interior views of the company's London showrooms with particulars of the service provided there.

Great Britain's Radio Exports.

According to the *Wireless and Gramophone Trader*, the total value of the radio apparatus exported from this country during May last was £88,617, including valves, valued at £27,595. The principal market was Australia, whose share amounted to £11,327 (valves £8,271); the Netherlands was second with £10,204 (valves £657); and Iceland third with £9,389 (valves £2,150). Other leading customers were:—France, £7,770 (valves £5,157); Italy, £6,745 (valves £790); the Union of South Africa, £6,371 (valves £1,752); and India and Burma, £5,210 (valves £532). Re-exports totalled £35,598, of which valves accounted for £443. The bulk of this (£29,435) was re-shipped to the Netherlands.

The British Industries Fair.

Four-fifths of the space in the British Industries Fair to be held at Olympia, London, and Castle Bromwich, Birmingham, from February 16th to 27th next year has already been let, the total area booked in the two sections up to August 1st amounting to more than 400,000 sq. ft. In the London Section, where the area available is 300,000 sq. ft., bookings up to August 4th amounted to 236,000 sq. ft., which is more than the amount booked at this time of year for any previous Fair.

Reported Purchase of Macintosh Cable Co.

The *Financial Times* says that it is reported that the Dunlop Rubber Company has disposed of its interest in the Macintosh Cable Co. to British Insulated Cables, Ltd., on terms which would give the Dunlop Company a price considerably in excess of the figure at which it appears in the books.

For Sale.

Mr. Henry J. Shaw is to sell by auction several trade stocks of electrical and wireless apparatus on Thursday, August 14th, at 13, High Holborn, W.C.1.

(See our advertisement pages to-day.)

Prices of Materials.

The following prices are only general, and they may vary according to quantities and other circumstances:—

	CHEMICALS, &c.	Price Aug. 5	Fortnight's inc. or dec.
a	Acid, Oxalic ... ... per lb.	5¾d.	...
a	Ammoniac, Sal ... ... per ton	£60	...
a	Ammonia, Muriate (large crystal) ,,	£52	...
a	Bisulphide of Carbon ... ... ,,	...	...
a	Borax ... ... ,,	£17	...
a	Copper Sulphate ... ... ,,	£25 10s.	...
a	Potash, Chlorate ... . per lb.	3d. to 4d.	...
a	,, Perchlorate ... ... ,,	5½d.	...
a	Shellac ... ... per cwt.	£13 10s.	...
a	Sulphur, Commercial ... ... ,,	£11	...
a	,, Roll ... ... ,,	£11	...
a	Soda, Chlorate ... ... per lb.	3d.	...
a	,, Crystals ... ... per ton.	£5 to £5 5s.	...
a	Sodium Bichromate, casks ... per lb.	3½d.	...
	METALS, &c.		
b	Aluminium, Ingots ... ... per ton.	£95 to £100	...
b	,, Wire ... ... per lb.	1/1 to 1/9	...
b	,, Sheet ... ... ,,	1/1 to 2/9	...
p	Babbitts Metal and Anti-friction Metals—		
	Grade I ... ... per ton net.	£129	...
	Grade II ... ... ,, ,,	£93	...
	Grade III ... ... ,, ,,	£56	...
c	Brass (rolled metal 2" to 12" basis) per lb.	8¾d.	...
c	,, Tubes (solid drawn) ... ,,	10½d. to 10⅞d.	...
c	,, Wire, basis ... ... ,,	8¾d.	¼d. dec.
c	Copper Tubes (solid drawn) ... ,,	11½d.	...
g	,, Bars (best selected) ... per ton	£79	...
g	,, Sheet ... ... ,,	£79	...
g	,, Rod ... ... ,,	£79	...
d	,, (Electrolytic) Bars ... ,,	£62 2s. 6d.	£1 13s. 9d. dec.
d	,, ,, Sheets ... ,,	£143 10s.	...
d	,, ,, Wire Rods ... ,,	£62 2s. 6d.	£1 3s. 9d. dec.
d	,, ,, H.C. Wire per lb.	8d.	½d. dec.
f	Ebonite Rod ... ... ,,	2/3 to 2/6	...
f	,, Sheet ... ... ,,	2/3 to 2/6	...
n	German Silver Wire ... ... ,,	2/2	...
h	Gutta-percha, fine ... ... ,,	nom.	...
h	India-rubber, Para fine ... ... ,,	6¾d.	¼d. dec.
i	Iron, Pig (Cleveland No. 3.) ... per ton.	79/6	...
l	,, Wire, galv. No. 8. P.O. qual. ,,	£20	...
g	Lead, English pig ... ... ,,	£19 15s.	...
g	Mercury ... ... per bot.	£22 12s. 6d. to £22 15s.	...
e	Mica (in original cases) small ... per lb.	6d. to 3/-	...
e	,, ,, medium ,,	4/- to 8/-	...
e	,, ,, large ... ,,	10/- to 20/- & up	...
p	Phosphor Bronze, plain castings ,,	1/1½d.	1d. dec.
p	,, ,, drawn bars & rods ,,	1/1½d.	1d. dec.
p	,, ,, rolled strip & sheet ,,	1/2½d.	½d. dec.
p	,, ,, wire ... ... ,,	1/1¾d.	¼d. dec.
o	Platinum ... ... per oz.	£8 5s.	10s. dec.
d	Silicium Bronze Wire ... ... per lb.	9½d.	½d. dec.
r	Steel, Magnet, in bars ... ... ,,	7¾d.	...
g	Tin, Block (English) ... ... per ton	£139 to £139 10s.	£1 15s. inc.
n	,, Wire, Nos. 1 to 16 ... ... per lb.	3/2	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

Messrs. James Forster & Co., in their letter dated August 1st, said that a slightly easier tone was apparent in the lead market last week, but as prices are still closely controlled it is unlikely that they will be allowed to fall much. A backwardation of 3s. 9d. per ton was seen at the end of last month through a shortage of market lead, although there was a surplus of prompt lead arriving last week-end. Demand from consumers remains quiet and is confined to purchases for early delivery.

Lighting and Power Notes.

Argentina.—Santa Fé.—The City Council has received an offer from the Cia. Argentina de Tranvias y Fuerza, Ltd., to purchase the municipal electricity undertaking for $5,000,000, with an annual contribution for ten years of 5 per cent. and from then on 6 per cent. of the total receipts from the sale of electricity to private consumers. The company also agrees to a substantial reduction in its existing charges for electricity.

Beckenham.—Mains Extensions.—The Urban District Council has received sanction to a loan of £2,258 for laying h.p. mains.

Birkenhead.—Loan Sanctioned.—The Town Council has received sanction to a loan of £10,565 in respect of plant, &c., for the purpose of giving a supply of electricity to the works of Cammell, Laird & Co., Ltd.

Birmingham.—Transformer Kiosks and Sub-stations.—Transformer kiosks are to be erected in several of the municipal housing estates of Birmingham. Sub-stations are also to be built at Stratford Road, Sparkhill, and Alexandra Road, Bournville.

Bradford.—Year's Working.—The accounts of the Corporation Electricity Department for the year ended March 31st show a gross profit of £13,756, which is converted into a loss of £5,788 after allowing for sinking fund and loan charges.

Canada.—Large Electrical Equipment Contract.—The Canadian Westinghouse Company, of Hamilton, Ontario, has been awarded the contract for electrical equipment amounting to about $2,000,000 for the Chats Falls development on the Ottawa River. Work has been steadily in progress since last September, and about 1,200 men are now employed. It is a joint undertaking between the Ontario Hydro-Electric Commission, which holds the Ontario rights, and the Chats Falls Power Company, of Montreal, which owns the site on the Quebec side of the river. It is planned to develop some 225,000 h.p. at a cost of about $20,000,000.

Bridge River Tunnel Completed.—The *Financial Times* states that the Bridge River tunnel, which has been in process of boring for two and a half years, has been completed at a cost of $1,750,000. The tunnel is part of the Bridge River hydro-electric development, 150 miles north of Vancouver, now being undertaken by the B.C. Electric Railway Company. The tunnel will convey sufficient water to develop 216,000 h.p. Ultimately another tunnel will be bored, raising the capacity of the power plant to over 500,000 h.p. The first unit of the Bridge River power plant will have a capacity of 54,000 h.p., and will cost $14,000,000.

Another West Kootenay Project.—Another large hydro-electrical development is to be started in the southern interior of British Columbia by the West Kootenay Power & Light Company, it is announced in preliminary plans which have been submitted to the Government. The company proposes to erect a third big plant on the Kootenay River to develop at least 30,000 h.p. at first and probably much more later. With the new plant at West Kootenay the development of the Kootenay River will be one of the most important in Canada. Already it is developing 162,000 h.p. and the new project raises this to almost 200,000 h.p.

Carlisle.—Overhead Lines.—The City Electricity Committee has authorised the electrical engineer to accept tenders for the supply of cables and materials required in connection with the erection of the overhead line between Cocklakes and Brampton.

Chesterfield.—Alternative Tariffs.—The Corporation Electricity Committee recommends alternative charges to consumers who guarantee to use a minimum of 5,000 kWh for heating purposes as follows:—Between 3.30 p.m. and 6.30 p.m., 1¼d. per kWh; between 6.30 p.m. and 3.30 p.m., ¾d. per kWh.

Chile.—Proposed Nationalisation of Electricity Undertakings.—A scheme has been presented to Congress for the formation of a national company for the purpose of taking over all existing electric power plants and services.

China.—Power Station Construction Scheme.—According to a project of the Chinese National Reconstruction Commission, four large power stations are to be established along the Shanghai-Nanking railway line so that power for various public and private utilities may be available throughout the district. It is planned that the various stations will also supply power for the operation of tramways in Nanking, Wusih, and Soochow, besides various industrial plants, irrigation systems, and other public utility services in the various districts traversed by the railway line.

Continental.—France.—The French Budget for the current year includes a sum of £2,000,000 to be expended as subsidies in respect of new plants intended to utilise the water power resources of France.

The Société des Forces Motrices de la Vienne, of Paris, has recently secured a concession to establish three hydro-electric power stations with a total capacity of 12,000 kW at Rempnat, Negremont, and Chammet (Haute Vienne) to utilise the power of the rivers Vienne and Chandouille. The work will entail the construction of two large dams, one at Vinzannet and one near the village of Chammet.

Greece.—A company known as the Société de l'Energie Electrique de Verria-Athenes is reported to have secured the concession to utilise the water-power resources of Macedonia and to construct and work a hydro-electric power station at Verria.

East England.—C.E.B. Scheme Adopted.—The East England Electricity Scheme, drafted by the Electricity Commissioners and transmitted by them to the Central Electricity Board in May last (see Elec. Rev. May 16th, 1930) was officially adopted by the Board on July 31st. Mr. P. G. Campling, A.M.I.E.E., borough electrical engineer at Great Yarmouth, has been appointed as the Board's district engineer for the area.

Exeter.—New Electricity Tariffs.—The Corporation Electricity Committee has brought into operation a flat rate of 2d. per kWh for late shop-window lighting and illuminated advertisements. A rate of ¾d. per kWh is to apply to electricity consumed in flats for domestic purposes, subject to a standing charge of £1 2s. 6d. per year for each living room and 7s. 6d. for each bedroom.

Federated Malay States.—Perak Hydro-Electric Scheme.—The Perak River Hydro-electric Power Co., Ltd., states that satisfactory progress is being made with the work on the dam and power-house which are being erected in connection with the Perak hydro-electric scheme. The only remaining work on the dam is the completion of four slab sections at the crest and certain other works which are above the high-water level, and will in no way interfere with commercial operation of the plant. The first turbine and generator unit with the outdoor sub-station and switchgear is now in operation. Final adjustment of the second unit will be proceeded with at once. The erection of the third unit is practically completed. The steam station at Malim Nawar has been in continuous operation since the date of the last report, and has supplied the whole system during that period. Owing to the depression in the tin-mining industry, however, the steady increase in load at the rate which was anticipated has not materialised; some of the smaller consumers have even had to close down their mines owing to tin restriction. This has affected receipts from the sale of power. The company now has a total connected load of 19,757 kVA. There are in addition service lines under construction or negotiation for wayleaves representing a further 2,500 kVA. The erection of the main 66,000-V transmission lines has been completed and the hydro-electric and steam stations have been interconnected. It has been found necessary to extend the secondary 22,000-V lines to the south of Tanjong Toh Alang in order to supply a number of large dredging interests in this area. The construction of the five miles of double circuit line required is well advanced.

Fort William.—The Lochaber Hydro-Electric Scheme.—The first stage of the Lochaber hydro-electric scheme was inaugurated at Fort William on July 30th by the Duke of York. When completed, the power station at Fort William will have a capacity of 120,000 h.p.; the energy generated will for the most part be used for the manufacture of aluminium locally.

Godalming.—Special Order.—The Electricity Commissioners have submitted to the Minister of Transport for confirmation a Special Order made by them authorising the Aldershot Gas, Water and District Lighting Co. to supply electricity in the borough of Godalming and parts of the parishes of Godalming Rural and Compton in the rural district of Compton.

Guildford.—Mains Extensions.—The Corporation Electricity Committee is applying for sanction to the borrowing of £13,809 for mains extensions.

Hull.—Extension of Hire-purchase Scheme.—The Corporation Electricity Committee has extended its scheme for the hire-purchase of domestic electrical apparatus, which hitherto has applied only to cookers and kettles, so as to include all electricity-consuming domestic appliances from the showrooms costing £2 10s., or upwards, exclusive of wiring.

Cooling Tower Improvements.—The Electricity Committee has obtained sanction to the borrowing of £16,708 for the provision of an additional cooling tower. The Committee has also decided to improve the circulating water system at the Sculcoates cooling towers at an estimated cost of £2,000.

Loan.—Application is to be made for sanction to a loan of £100,000 for mains and services.

Ipswich.—Year's Working.—The accounts of the Corporation Electricity Department (engineer: Mr. A. S. Black) for the twelve months ended March 31st last record a total revenue of £165,334, a working expenditure of £86,392, and a gross profit of £78,943. The figures for the preceding year were: Income, £140,587; working expenses, £72,659; gross profit, £67,928. To the gross profit was added income from other sources making a total of £78,997 available, and after deducting capital and other charges there was a net surplus of £24,626, as compared with £19,368 in the preceding year. The capital expended during the year totalled £143,969, bringing the total now spent on the undertaking to £780,003. Sales of electrical energy increased from 16,789,068 to 23,291,486 kWh and the maximum supply demanded from 9,950 to 13,400 kW.

Lancaster.—YEAR'S WORKING.—The income from the sale of electricity for the past financial year was £43,526, as against £32,648 in the previous year. Lighting and domestic receipts increased by £3,012, while income from motive power rose by £8,591. The substitution of 'buses for trams reduced the traction receipts by £724. The net revenue account showed a profit of £9,756. The capital expenditure during the year amounted to £49,676.

EXTENSIONS.—The Corporation Electricity Committee recommends a scheme of extensions costing £35,168.

Leeds.—BULK SUPPLY TO BATLEY.—The Corporation Electricity Committee has made an agreement with the Batley Corporation for a supply of electricity in bulk and is applying for sanction to the borrowing of £22,000 for interconnecting cables.

Liverpool.—CONCESSION TO NEIGHBOURING AREAS.—An offer has been made by the Corporation to the West Lancashire Rural District Council to supply electricity to Maghull, Lydiate and Aughton, under a sliding scale so that in four years' time, these areas will enjoy the same prices for electricity as those in Liverpool.

LOAN.—In connection with the distribution of electrical energy from the Clarence Dock generating station, sanction has been obtained by the Corporation Electric Supply Department to the borrowing of £130,000 in respect of sub-station buildings and equipment.

London.—ST. MARYLEBONE.—*Year's Working.*—The total revenue derived from the Borough Council electricity undertaking (chief engineer: Mr. C. H. Smith) during the year ended March 31st, 1930, showed a decrease from £545,116 to £543,436. Working expenses, however, rose from £315,630 to £346,620, the gross profit being £196,816, as compared with £229,486 in the preceding year. To the gross profit was added income from other sources making a total of £198,867 available from which the following charges had to be met: Interest on loans, £86,700; loan repayments, £95,397; taxes, £16,446; interest on general reserve, £6,426; depreciation of motors and apparatus for hire, £5,750; other items, £2,887. There was thus a net deficiency of £14,739, which compares with a net surplus of £22,120 in 1928-29. The capital expenditure during the year amounted to £144,066, bringing the total now spent on the undertaking to £3,358,357. The electricity sold decreased from 18 343,902 to 17,176,286 kWh, and the maximum load from 51,525 to 45,606 kW. The number of consumers, however, rose from 19,666 to 20,318. The average price obtained per kWh fell from 1.302d. to 1.189d.

SOUTHWARK.—The Borough Council Electricity Committee recommends an agreement with the City of London Electric Lighting Co., Ltd., for a bulk supply of electricity to the Council. In the event of the sanction of the Electricity Commissioners being received to the proposed agreement, tenders are to be invited during the summer recess for the work of alteration and reconstruction at the power station consequent upon taking a bulk supply.

Maldon.—REVISION OF MAXIMUM CHARGES.—As the result of an inquiry held by the Electricity Commissioners into the application of the Corporation and the Rural Council for a revision of the maximum prices which John Sadd & Sons, Ltd., may charge for electricity, the Minister of Transport has reduced the charge from 10d. to 8d. per kWh, as from July 1st last. The minimum charges are to be 10s. for each winter quarter and 6s. 8d. for each summer quarter.

Manchester.—EXPERIMENTAL ELECTRICAL HEATING OF SCHOOL.—The Corporation Education Committee has made arrangements with the Electricity Committee for the supply of electricity for the experimental electrical heating of the new Ladybarn Junior School.

Morecambe and Heysham.—YEAR'S WORKING.—The net profit of the Corporation electricity undertaking for last year amounted to £6,067, as compared with £5,547 in the previous year. The total revenue was £44,901, as against £37,243, there having been an increase of 750,000 kWh in the amount of energy sold. The profits would have been larger but for the new valuation of the premises for rating purposes, the reduction of the amount allowed for promenade and street lighting, and the increased levy made for carnival illuminations.

New Zealand.—AN OIL ENGINE SET.—A 6-cylinder vertical oil engine has recently been supplied by Messrs. Davey, Paxman & Co., Ltd., associated with Agricultural and General Engineers, Ltd., to the Marlborough (New Zealand) Electric Power Board. The engine is of the latest "Paxman" enclosed type, fitted with "spring injection" (Blackstone and Carter patent) and is capable of developing 700-770 b.h.p. It will be directly coupled to a 400-kW alternator supplied by the General Electric Co., Ltd.

THE ARAPUNI HYDRO-ELECTRIC SCHEME.—The New Zealand Government has appointed Professor P. G. Hornell, of Vattenbyggnadsbyran (V.B.B.), consulting engineers, of Stockholm, to report on the damage done to the Arapuni hydro-electric plant on the Waikato River (*vide* the ELEC. REV. June 20th, p. 1155). Professor Hornell and a technical assistant left London for New Zealand on July 26th.

Nottingham.—YEAR'S WORKING.—The annual report of the Corporation Electricity Committee states that there was an increase of 6,193 in the number of consumers during the year ended March 31st last. The undertaking contributed £73,361 in rates and taxes and the Finance Committee had taken from the profits £18,550 for the relief of rates. There was a considerable increase in the cost of coal, but in spite of this the undertaking was able to show a profit of about £8,000.

Peterborough.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer and manager: Mr. H. A. Nevill) for the year ended March 31st last show a total revenue of £128,155 and a working expenditure of £73,015, leaving a gross profit of £55,140. The corresponding figures for the previous year were: Income, £118,685; working expenses, £65,366; gross profit, £53,319. After providing for capital and other charges there was a net deficit of £8,747, as compared with £5,560 in the preceding year. The capital expenditure during the year amounted to £48,875, the principal items being £9,329 for machinery and plant, £9,373 for l.p. mains and £9,520 for h.p. mains. The total now spent on the undertaking is £838,457. The electrical energy sold increased from 24,795,000 to 28,340,000 kWh and the maximum demand from 8,500 to 9,250 kW. The average price obtained per kWh rose from 1.080d. to 1.023d. The total number of consumers amounted to 4,324, representing a total of 23,256 kW in connections, as against 3,700 and 19,846 kW, respectively. Continued progress was made with the hiring of cookers, there being 1,127 on circuit as compared with 942.

Price Reduction.—SCUNTHORPE.—The Urban District Council has reduced its domestic tariff for electricity from 1½d. to 1d. per kWh, plus 15 per cent. of the rateable value.

Ripon.—EXTENSIONS.—The Corporation Electricity Committee is applying for sanction to a loan of £5,000 for extensions.

Stalybridge.—MAINS EXTENSIONS.—The Stalybridge, Hyde, Mossley, and Dukinfield Tramways and Electricity Board is to make application for sanction to a loan of £50,000 for prospective expenditure on mains.

Tynemouth.—MAINS EXTENSIONS.—The Corporation Electricity Committee has received sanction to a loan of £5,000 for mains extensions.

SUPPLY TO HOSPITAL.—The Electricity Committee has authorised the electrical engineer to proceed with the laying of an underground cable at a cost of £900, to supply electricity to Moor Park Hospital.

Willesden.—YEAR'S WORKING.—We have received a copy of the accounts together with the annual report of the Urban District Council's electricity undertaking (engineer: Mr. A. W. Blake) for the year ended March 31st last. The total revenue is shown to be £196,892 and the working expenses £143,515, leaving a gross profit of £53,376. The previous year's figures were: Income, £180,945; working expenses, £123,315; gross profit, £57,629. Income from other sources added to the gross profit made a total of £54,028 available for distribution. After providing for loan interest, repayment of loans, and the expenditure of £9,695 on special items, there was a net deficiency of £1,119, as compared with a net surplus of £4,397 in 1928-29. There was also a net deficiency of £2,568 on the showroom account. The capital expenditure during the year amounted to £99,948, the chief item being £67,801 for mains and services; the total spent on the undertaking now stands at £823,107. The electrical energy sold increased from 25,787,227 to 29,148,374 kWh, the average price obtained per kWh falling from 1.663d. to 1.603d. A new reduced tariff was in operation from the beginning of the year 1929-30.

Tramway and Railway Notes.

Argentina.—BUENOS AIRES.—According to *The Times*, the City Council has approved the proposal of the Compania Anonima de Proyectos y Construcciones de Madrid for the construction of an underground railway, despite the Lord Mayor's recommendation to the contrary.

Continental.—BELGIUM.—A Commission, on which the Government, the Brussels municipality and the Brussels Tramway Co. is represented, has recently been appointed to consider the question of constructing an underground electric railway to relieve the increasing traffic in the Belgian capital.

GERMANY.—According to *The Times*, a report has recently been issued by Messrs. Price, Waterhouse & Co. upon the finances of the Berlin Traffic Co. This company is probably one of the largest municipal undertakings in the world. It combines the whole of the city's omnibus, tramway, and underground services, which began as private undertakings, gradually came under municipal control, and were amalgamated at the end of 1928 in the one company with a capital of £20,000,000. This year's balance-sheet and report cover the first year's working as a combined undertaking. The balance-sheet showed a profit of about 12,000,000 m.

(£600,000). The report spoke of falling traffic figures and declining income, in spite of heavy increases in fares, and hinted at the necessity for a loan. It has been known for some time that the company contemplated raising a foreign loan, but the arrangements were never completed.

Exeter.—Tramway Abandonment.—At a special meeting of the City Council, held recently, it was decided to abolish the existing tramway system by degrees, and substitute petrol omnibuses. The recommendation of the Tramways Committee to make the change was opposed in the final vote by only one member. It was stated that three experimental double-decked 'buses had been in operation in Exeter during the preceding week. From Wednesday to Sunday evening, the three 'buses had carried 25,845 passengers, as against 13,758 passengers by three trams. Receipts from the 'buses totalled £145 and from the trams £70. The entire scrapping of the trams would mean 2¾d. on the rates, and 1¼d. for the repair of the roads. The loan charges would be a 1¼d. rate for a period of eight years. It was estimated that the profit on the 'buses would equal a 1d. rate. The 'buses would therefore cost the city about a 4¼d. rate. In addition, it was pointed out that ten per cent. of the Electricity Committee's output would be taken away, and leave the department with machinery unsuitable for other purposes. If the decision had been put off for another three to five years, the Tramways Committee would have been compelled to carry out certain urgent track renewals and improvements.

Ipswich.—Year's Working.—The report on the working of the Corporation railless-car undertaking (engineer and manager: Mr. A. S. Black) for the year ended March 31st, 1930, shows an increase in total income from £63,410 to £67,859. The total working expenditure rose from £48,235 to £49,672, leaving a gross profit of £18,187 (£15,175). After providing for capital and other charges there was a net surplus of £4,461, as compared with £7,017 in the preceding year. The number of passengers carried increased from 11,313,791 to 12,175,012 and the car mileage from 1,210,444 to 1,260,092. The average total revenue per car mile was 12.573d., as against 12.924d.

Liverpool.—Year's Working.—We have received from Mr. P. Priestly, general manager of the Corporation Tramways, a copy of his report for the twelve months ended March 31st last. The total revenue showed an increase from £1,567,180 to £1,602,229, while operating costs, including rental and leased lines, amounted to £1,392,526, as compared with £1,292,419 in the previous year. The gross profit fell from £274,761 to £209,703. After deducting loan interest (£62,797), sinking fund and repayment of loans (£74,889), there remained a net surplus of £72,015, as compared with £154,438 in 1928-29. The total amount spent on the undertaking at the end of the year was £3,722,027. The number of passengers carried totalled 285,122,268, which was an increase over the previous twelve months of 7,222,371. The car miles run amounted to 22,914,971, as compared with 21,146,625, while the earnings per car mile fell from 17.529d. to 16.532d. During the year 24 cars were reconstructed and fitted with enclosed vestibule platforms with upholstered seats on the lower deck; about 26 miles of trolley wire was renewed. Express 'bus services at fares higher than tramcar fares have been introduced from the centre of the city to districts already served by trams. These services are being fairly well patronised during rush hours, but during the other portions of the day passengers use the tramcars and pay the lower fares. Free passes to blind persons, ex-Service men, &c., are estimated to have cost the Department £15,493.

London.—L.C.C. Tramway Accounts.—The Highways Committee recently submitted to the London County Council its report on the working of the tramways for the year ended March 31st last. The total income amounted to £4,460,536, as compared with £4,373,944 in the preceding year, while working expenses were £3,613,329, as against £3,684,987. There was consequently an increased gross profit of £847,207 (£688,957). Capital charges amounted to £718,403 and there was a net surplus of £128,804, as compared with a net deficiency of £6,790 in 1928-29. The chief factors in the improvement shown were an increase of £86,391 in passenger traffic receipts, and a net reduction of £72,564 in working expenses. The surplus for the year under review (£128,804) is £76,234 more than the revised estimated surplus for the year and £87,905 more than the original estimated surplus. The Highways Committee has informed the Finance Committee that it considers the surplus should be carried forward to the 1930-31 account. The total number of passengers carried during the year was 726,414,871, and the number of car miles run was 70,756,225; the corresponding figures for the previous year were 712,694,996 and 70,170,486. The length of route operated by the Council at March 31st was 166.28 miles.

The total net capital expenditure on the undertaking up to March 31st was £17,719,199, of which £294,907 represented expenditure during 1929-30. The amount of debt incurred up to the end of that period was £18,126,719 and the net debt outstanding, after allowing for debt repaid and sinking fund balances, was £8,300,594. The total sum charged in the accounts of the undertaking for redemption of debt was £8,992,892, including £506,144, for the year under review, to which must be added £833,233 from proceeds of sales, gain on cancellation of stock and interest on accumulations of sinking fund, increasing the total provision for redemption of debt to £9,826,125. The amount of capital expenditure which, up to March 31st last had become obsolete owing to the electrification of the horse tramways was £2,024,688, but the debt in respect of this expenditure has been reduced to £691,770 by the ordinary process of repayment and by proceeds of sales. Certain expenditure amounting to £810,678 incurred in connection with electric traction had also been rendered obsolete. The debt outstanding in respect of obsolete capital expenditure on electric traction amounts to £73,007; this relates to the purchase from the London United Tramways, Ltd., of the portion of its undertaking in London.

The sums paid to metropolitan borough councils and the City Corporation for rates on the permanent way amounted to £27,075 This amount was in addition to rates (£71,693) paid by the Council in respect of tramway offices, power station, car sheds, sub-stations, depôts, &c. The saving to the road authorities in consequence of the obligation of the Council to maintain the paving along the tramway routes was estimated at the end of the year under review to be about £233,500 a year on the present mileage. The amount charged up to the end of the year to the tramways capital account, in respect of the cost of effecting street improvements along tramway routes, under resolutions already passed by the Council, is £752,280.

South Lancashire.—Railless Cars.—The South Lancashire Transport Co substituted railless cars for trams on the service between Atherton and Ashton-in-Makerfield on July 30th.

Telegraph and Telephone Notes.

Brazil.—Telephony.—Rio de Janeiro outgrew its telephone system many years ago and as a consequence all the exchanges are very much overloaded. So soon, therefore, as the agreement was made with the municipality in March, 1929, the Companhia Telephonica Braziliera, a subsidiary of the Brazilian Traction, Light & Power Co., began the installation of additional cables and automatic switchboards to provide for many thousands of subscribers. This work has been carried out in record time and with the least possible interference with the service. The first automatic exchange was inaugurated early this year. The re-equipment of the existing Ipanema exchange is well in hand and it was hoped that its inauguration would take place some time last month. The Central exchange also is being replaced and a new one substituted for those now known as "Jardim" and "Piedade." When this work is completed the larger portion of the city's telephone system will have been converted to automatic operation.

Irish Free State.—Telegraph and Telephone Services.—The Free State telegraph and telephone accounts for the year ended March 31st, 1929, which have just been published, show that there were deficits of £147,955 and £34,719 on the telegraph and telephone services, respectively.

International Telephony.—New Channel Cable.—In order to cope with the increased volume of traffic between England and the Continent a 28-circuit submarine cable was to be laid across the Channel from Boulogne to Seabrook, near Folkestone, last Tuesday. The cable is being laid as part of Germany's war reparations.

Shetland Islands.—Telephony Need.—The Shetlands County Council has decided to seek the co-operation of the Board of Trade and the Royal National Lifeboat Institution in persuading the Post Office to link up the mainland and the outlying islands with an efficient telephone service. The danger to life entailed by the lack of telephone facilities was emphasised by Provost Sinclair at a meeting at Lerwick. The use of the lifeboats, he said, was entirely dependent upon the rapidity with which messages for help could be received from outlying places, and without telephones such messages could not be received.

South America.—Telephony in Bogota.—As an example of exceptional operating development, it is noteworthy to observe the following statistics of the Bogota Telephone Company since it came under the ægis of the Cable, Telephone and General Trust, Ltd., in June of last year. At that time the company, which serves the capital city of perhaps the most progressive State in South America, had 7,000 stations, whereas the number in service at the end of June of this year approached 11,000, representing an increase of approximately 57 per cent. per annum. For the first five months of 1930 the increase in stations over the total at December 31st, 1929, actually represented a rate of 60.29 per cent. per annum, a remarkable figure in any circumstances, and even more noteworthy when regard is had to the world depression from which Colombia is not immune. An ambitious construction scheme is now maturing.

Sweden.—Telephone Development.—According to the annual report of the State Telephone and Telegraph Department, last year the number of telephones in use increased by 23,107, against an increase of 18,692 during 1928; the number at the beginning of 1930 was 495,312, while the number of

calls increased by 34.2 millions, or about 5 per cent. Sweden now has more than 83 telephones per 1,000 inhabitants, and the city of Stockholm has 305 per 1,000, thus being second in the entire world, surpassed only by San Francisco. Sweden's international activity is reflected by the increase of the foreign telephone traffic, which rose by 27.5 per cent. during 1929, against an increase of only 8.7 per cent. during 1928. During the year the Department established new telephone connections with eight countries: Italy, Latvia, the Irish Free State, Estonia, Poland, Portugal, Spain, and Argentina. The foreign telegraph traffic also showed a general increase. The gross revenue of the Department increased by £192,222 to £5,230,000, while expenses only rose by £36,111 to £3,957,777, leaving a net surplus of £1,227,222, corresponding to 7.32 per cent. on the State capital voted to the Department for the year's expenses. During the year 118 new call offices and 44.000 kilometers of new lines were built, and the rates were reduced by a total sum of £97,222. In spite of the increase in the activity of the Department, the increased number of automatic exchanges made it possible to reduce the number of employés by 269.

The Telegraph Service.—Deficit.—Post Office accounts for the year 1929-30 show that the loss on the telegraph service amounted to £785,000, the expenditure reaching £5,788,000 and the income totalling £5,003,000.

The Telephone Service.—Finance.—Post Office returns for the year 1929-30 indicate that a profit of £578,000 was made on the telephone service, the income being £21,868,000 against expenditure of £21,350,000.

U.S.A.—River Cable Subway.—Transatlantic telephone calls will soon pass through one of the largest iron pipes ever made. It will be 614 ft. long and every foot of it will weigh three quarters of a ton. It will form a subway for 150,000 telephone circuits under the Harlem River from Manhattan Island, on which New York is built, to the Bronx district. Calls from Europe, *via* New York, to New England, Canada, and points west will pass through it. The pipe will be 7 ft. in diameter under the river, widening to 9 ft. at either end. It will be entirely encased in concrete and will rest on piles 27 ft. below low-water level.

Radio Notes.

Australia.—Licences.—The director of postal services (Mr. H. P. Brown) announced recently that the number of listeners' licences in the Commonwealth increased by 2,561 last May. The total number on May 30th was 311,322. Victoria still had the largest number, 141,081. Some 1,880 new licences were issued and 1,744 were cancelled in May. The numbers for other States were:—New South Wales, 2,381 new licences, 1,055 cancellations, 110,682 in force on May 30th; Queensland, 690, 369, 22,797; South Australia, 567, 372, 25,448; Western Australia, 404, 15, 5,552; Tasmania, 171, 77, 5,762.

Continental Relays.—Austria.—The first musical programme to be relayed by telephone line from Austria to British listeners was broadcast from the London and Midland regional transmitters on Thursday evening, August 7th. The extension of Continental relays to Austria marks a further advance in international broadcasting and was made possible by the completion of the new cable from Nurnberg, through Passau in Germany, to Linz in Austria, and thence to Vienna. The cable contains broadcasting circuits suitable for high-quality music transmission. For the relay of the programme yesterday more than one thousand miles of circuit was used, the route being Salzburg, Linz, Nurnberg, Stuttgart, Frankfurt, Cologne, Aachen, Liége, Ghent, Ostend, La Panne, Canterbury and London.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the Electrical Review containing the advertisement is given in parentheses below.

Contracts Open.

Australia.—Melbourne.—Posts and Telegraphs Department. September 23rd. Rectifiers and charging resistances. (A.X. 9968.)*

September 30th. Switchboard, instruments, and test plugs and sleeves. (A.X. 9937.)*

October 14th. Condensers. (A.X. 10000.)*

Sydney.—August 18th. Municipal Council. A.c. consumers' meters. Specifications, &c., from the Construction Engineer, Electricity Department (deposit £1). Tenders to W. G. Layton, town clerk.

Brisbane.—September 29th. City Electric Light Co., Ltd. 550-kVA, 5,000 to 415-240-V outdoor-type transformers. Specifications (£2 2s. first copy, 10s. 6d. each additional copy) from J. T. Ryan, secretary to the company, Boundary Street, Brisbane.

Bingley.—August 22nd. West Riding County Council. Installation of electric light at extensions to Bingley Grammar School. J. Charles McGrath, clerk to the Council, County Hall, Wakefield.

Brighton.—August 21st. Corporation. Turbo-alternator, with condensing plant and auxiliaries. (July 25th.)

Bristol.—August 14th. Public Assistance Committee. Electrical fittings for six months. Particulars from T. S. Lamb, St. Peter's Hospital.

Canada.—Regina (Saskatchewan).—August 11th. City Council. Transformers and switchgear. (A.X. 9870.)*

Dundee.—August 13th. Electricity Department. L.p. cable. (August 1st.)

Egypt.—Cairo.—Ministry of the Interior. September 9th. Diesel-driven generator. (A.X. 9873.)*

September 14th. Four electric air compressor sets. (A.X 9886.)*

September 30th. Electric motors, pumps, &c., at the Dessouk waterworks. (A.X. 9935.)*

Egyptian State Railways.—October 2nd. 100-ton electrically-driven shallow-type locomotive traverser.

Erith.—August 25th. Electricity Department. H.p. switchgear and sub-station equipment. (See this issue.)

Halifax.—August 18th. Improvements Committee. Electrician's work required in erection of shops and offices. (Bull Green development.) Specifications (deposit £2 2s.) from A. C. Tipple, borough engineer, Crossley Street.

Hull.—September 18th. Electricity Department. Cooling tower pump and accessories. (August 1st.)

Corporation Telephone Committee. Private automatic telephone switchboard. (See this issue.)

Ilford.—August 11th. Electricity Department. Dismantling and removal of plant at Suffolk Road refuse destructor. (July 18th.)

India.—Simla.—August 21st Indian Store Department. Single or multi-stage horizontal centrifugal pump, slip-ring induction motor, complete with starter, &c. (A.X. 10010.)*

August 19th. Supply of electric lamps during the year 1930-31.

Irlam.—August 20th. Urban District Council. 33-kV underground cables, l.p. distributor cables, sub-station switchgear, and transformers. (July 25th.)

London.—Islington.—September 10th. Borough Council. Switchgear for sub-stations. (July 25th.)

September 2nd. Cleansing Committee. Battery for driving refuse-collecting vehicle. (August 1st.)

London County Council.—August 11th. Wiring and fitting buildings on Loughborough Road housing estate. (July 18th.)

August 20th. Five electric lifts at Highgate Hill Infirmary. (August 1st.)

Bethnal Green.—September 1st. Borough Council. Electric lighting installation work at several blocks of tenement dwellings. (See this issue.)

Lourenco Marques.—October 17th. Board of Ports and Railways. Automatic sgnalling system on the Ressano Garcia line. (A.X. 9971.)*

Newbury.—September 1st. Corporation. Two electrically-driven bore-hole pumps, together with boosters, switchgear, transformers, &c. (See this issue.)

Newcastle-upon-Tyne.—September 15th. Newcastle-upon-Tyne Electric Supply Co., Ltd. Circulating water pumps and pump house equipment. Boiler house coal-handling plant. (August 1st.)

New Zealand.—Wellington.—September 2nd. Post and Telegraph Department. Telephone bells. (A.X. 9871.)*
September 9th. Resistance stools. (A.X. 9867.)*
Invercargill.—September 8th. City Council. Paper-insulated 3-core cable. (A.X. 9947.)*

Salford.—August 25th. Electricity Department. Annual supply of 6,600/400-V three-phase transformers. (See this issue.)

Shipley.—August 22nd. West Riding County Council. Installation of electric light, and wiring to power motors, at Shipley Technical Institute (Textile Shed). J. Charles McGrath, clerk to the Council, County Hall, Wakefield.

South Africa.—Umtata.—September 2nd. Municipal Council. Water turbo-alternator, transformer, pipe line and transmission line, together with suspension bridge and telpher gear. (A.X. 9874.)*
Cape Town.—August 27th. City Electricity Department. Electric motors and starters. (A.X. 9966.)*
Johannesburg.—August 28th. City Council. Transformers. (A.X. 10003.)*
Paarl.—August 23rd. Municipal Council. Two centrifugal four-stage high lift pumps, electric motors, and switchgear. (A.X. 9996.)*

Stoke-on-Trent.—August 29th. City Council. Installation of electric lighting at new hospital pavilion at the London Road Institution, Newcastle, Staffs. (See this issue.)

Turton.—August 28th. Electricity Department. L.p. cables, distribution pillar, kiosk and transformer, &c. (See this issue.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.

Contracts Closed.

Barrow-in-Furness.—Corporation. Accepted :—
Electric cookers (£166).—Credenda Conduits Co., Ltd.

Billericay.—Rural District Council. Accepted :—
Installation of electric lighting plant, including a 50-V generating set, at the Isolation Hospital (£175).—Brentwood District Electric Installations, Ltd.

Colchester.—Education Committee. Accepted :—
Installation of electric light at the Canterbury Road schools.—E. Bailey.

Heston and Isleworth.—Urban District Council. In addition to accepting the tender of the Hackbridge Electric Construction Co., Ltd., for a 3,000-kVA transformer, as reported in our last issue, the Council, at the same meeting, awarded the following contracts :—
Yearly contract for cables.—Enfield Cable Works, Ltd.
11,000-V switchgear.—General Electric Co., Ltd.
22,000-V switchgear.—A. Reyrolle & Co., Ltd.

Hornsey.—Housing Committee. Recommended :—
Wiring houses for electricity (£1,897).—E. Wight & Co.
Libraries Committee. Recommended :—
Re-wiring Stroud Green library (£99).—H. Southey.

Hull.—Tramways Committee. Accepted :—
Two miles of trolley wire.—Richard Johnson & Nephew, Ltd.
Telephones Committee. Accepted :—
Bronze wire (£240).—F. Smith & Co.
Inside wire (£88).—W. T. Henley's Telegraph Works Co, Ltd.

Lichfield.—City Council. Accepted :—
Sub-station switchgear (£470).—Crompton Parkinson, Ltd.
Switchgear for Wade Street sub-station (£148).—Ferguson, Pailin, Ltd.

Liverpool.—Electric Power and Lighting Committee. Accepted :—
L.p. switchgear for static sub-stations, during the twelve months ending June 30th, 1931.—Metropolitan-Vickers Electrical Co., Ltd.
H.p. switchgear for static sub-stations for the twelve months ending June 30th, 1931.—Ferguson, Pailin, Ltd.
Corporation Watch Committee. Accepted :—
Provision and installation of an automatic telephone exchange at the central police station (£1,158).—Relay Automatic Telephone Co., Ltd.

Middlesex.—County Public Assistance Committee. Recommended :—
Re-wiring work at West Middlesex Hospital (£60).—Electrical Installations, Ltd.
Electrical installations at electrical and X-ray wards of West Middlesex Hospital :—

Belshaw & Co.	£1,955
Electrical Installations, Ltd.	1,459
W. J. Furze & Co.	1,400
Cecil Cooper	1,365
Read & Partners. (Recommended.) ...	1,297

Education Committee. Recommended :—
Electric lighting installation at Stanley School, Teddington (£399).—G. A. Weston.

Omagh (Co. Tyrone).—Urban District Council. Accepted :—
Generating plant (£1,958).—Crossley Bros., Ltd.
Main switchboard (£425), and overhead crane (£195).—General Electric Co., Ltd.
Underground and overhead mains (£4,051).—F. Reid, Ferens & Co.

Richmond-on-Thames.—Town Council. Accepted :—
Electrically-driven pumping plant for the waterworks (£4,368).—Worthington-Simpson, Ltd.

Sheffield.—Electric Supply Committee. Accepted :—
Three 500-kW steel-cylinder type mercury-arc rectifier equipments (£9,238).—Bruce Peebles & Co., Ltd.

Sunderland.—Town Council. Accepted :—
Medium pressure unit-type sub-station fuse groups (£2,466).—W. T. Henley's Telegraph Works Co., Ltd.
Sub-station instrument panels.—English Electric Co., Ltd.
V.i.r. wire.—William Geipel, Ltd.
T.r.s. wire.—Mersey Cable Works, Ltd.
V.i.r. flexibles.—Liverpool Cable Co., Ltd.
Meters.—Edison Swan Electric Co., Ltd.; Ferranti, Ltd.
Gasfilled and vacuum lamps and static transformers.—General Electric Co., Ltd.
E.h.p. mains.—British Insulated Cables, Ltd.
Medium and l.p. mains.—Pirelli-General Cable Works, Ltd.

Torquay.—Electricity Committee. Accepted :—
Switchgear (£2,768).—British Thomson-Houston Co., Ltd.

Warrington.—Electricity Committee. Accepted :—
Alterations to main e.h.p. switchgear at generating station.—British Thomson-Houston Co., Ltd.
New rings for 4-6,000-kW set.—Brush Electrical Engineering Co., Ltd.
Rewinding and repairs to 3,000-kW turbo-alternator rotor.—English Electric Co., Ltd.
E.h.p. sub-station switch.—George Ellison, Ltd.
Works Committee. Accepted :—
Electric hoist for Longford depôt.—Herbert Morris, Ltd.

Watford.—Electricity Committee. Recommended :—
Mechanical stoker (£1,750).—Underfeed Stoker Co., Ltd.

Weymouth.—Town Council. Accepted :—
Supply and laying of cables to Rodwell and Radipole, and transmission equipment (£7,531).—District Transmission Lines, Ltd.

Winchester.—Education Committee. Accepted :—
Electric light fittings, &c., for Danemark School.—Dicks, Ltd.

Forthcoming Events.

International Commission on Illumination.—Congress. September 2nd to 11th, tour of London, Glasgow, Edinburgh, Sheffield and Birmingham. September 13th to 19th at Cambridge.

British Association.—Bristol. September 3rd to 10th. Annual meeting

Association of Public Lighting Engineers.—Leicester. September 8th to 11th. Annual meeting and conference.

Institute of Metals.—Southampton. September 9th to 12th. Autumn meeting.

Iron and Steel Institute.—Prague, Czecho-Slovakia. September 15th to 20th. Autumn meeting.

Second British Glass Convention.—Buxton. September 17th to 20th.

National Radio Exhibition.—Olympia. September 19th to 27th.

International Central Station Engineers' Conference.—Brussels. September.

The "Electrical Review" Service Department.

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of makers of the following devices:—

Silverine alloy or similar material.

Instrument terminals with insulated knobs and to carry 30 amperes.

Notes.

The Drumm Battery.

A full trial of the Drumm battery (so-called because of the name of its inventor, Dr. Drumm, a native of Co. Down and a resident of the City of Dublin) has not yet been made. On trial trips to Sallins last week the specially fitted railway coach averaged 33 miles per hour, and at times went over 40, and it is expected that 50 miles will be easily reached with a following load of 400 tons. The coach was specially built at the Inchicore works and Mr. H. Morton, chief mechanical engineer of the Great Southern Railway, and Mr. W. Story, chief electrical engineer, and other officials were in charge of the tests. The Free State Minister for Industry and Commerce made the following report :—

(1) On account of the number of inaccurate accounts and completely unofficial claims given publicity in connection with the Drumm battery, the Minister for Industry and Commerce wishes at the beginning to make it clear that this is the first official statement issued to the Press of the advantages authoritatively claimed for the Drumm battery.

(2) The new battery is a low-resistance alkaline battery of robust construction.

(3) It has 50 per cent. higher voltage than existing alkaline batteries.

(4) On account of its low resistance it can be charged and discharged at much higher rates than existing alkaline batteries.

(5) The energy efficiency of the battery is 75 per cent. under practical conditions of operations.

(6) The current efficiency of the battery is 95 per cent.

(7) The construction of the battery is simpler than that of existing batteries and, therefore, the new type should be considerably less expensive to manufacture.

(8) The usual alkaline and acid batteries require five to eight hours for charging. Consequently for traction work they are generally charged at night, and the vehicle carries a battery sufficient for the full day's work. The Drumm battery, however. can be charged in periods ranging from 8 minutes to one hour, so that it is only necessary to carry a battery sufficient to operate the vehicle for the distance between charging points. This makes it particularly suitable for operating vehicles on a shuttle service and for railway operation when charging points can be arranged at suitable intervals.

(9) The ability of the battery to yield large currents, without appreciable voltage drop, enables it to give acceleration rates and maximum speed sufficient for the best type of railway service. The rate of acceleration and maximum speeds depend partially upon the size of the motors installed. With the Drumm battery acceleration rates of the order of 1 m.p.h. per second and maximum speeds of 50 to 60 m.p.h. may be maintained. The present coach is equipped with two 30-h.p. motors capable of 100 per cent. overload for ten minutes and 200 per cent. overload for a short period. The motors are designed for 110 volts, and when the total number of cells have been installed it is estimated that maximum speeds of over 50 m.p.h. may be attained. Other alkaline batteries are not suitable for this type of railway electrification on account of their relatively large internal resistance, inasmuch as the large currents required for acceleration and high speeds cause considerable voltage drop and also heat the battery and render it relatively inefficient. Acid batteries can be designed for large current discharges, but such batteries have a relatively short life.

(10) The Drumm battery is suitable for all types of service requiring (*a*) rapid input and output of energy; (*b*) robust construction; (*c*) freedom from fumes or gassing; and these characteristics render it particularly suitable for traction.

(11) While it is not yet possible to state definitely the length of life of the new battery, life tests are proceeding. The evidence already accumulated indicates that it will have a very long life. The railway tests have not yet been completed, as the total number of cells required have not yet been finished. It is expected, however, that they will be ready in the course of a few days. The tests, so far, have been eminently satisfactory and support the claim set out above.

(12) A number of unofficial reports by inexpert people refer to losses by leakage and danger of vibration. On these two points it may be stated (*a*) that the battery is so constructed that damage by vibration cannot result; and (*b*) that in respect of retention of charge it is superior to existing batteries of similar type.

Electricity on Poultry Farms.

In view of the many advantages of electricity for poultry breeding, breeders are finding it convenient to generate their own energy in some cases. Suitable internal-combustion-engine sets which are being supplied for this purpose will generate electricity, it is said, at a fuel- and lubricating-oil cost of less than ½d. per kilowatt-hour. This is the method adopted by Sterling Poultry Products, Ltd., whose Absol Park Farm, Felstead, was visited on July 26th by delegates to the World's Poultry Congress. The generating sets in this installation are, we are informed, by Blackstone & Co., Ltd., two 32-b.h.p. "spring-injection" crude-oil engines driving alternators by belt.

Public Lighting Conference.

The annual conference of the Association of Public Lighting Engineers will be held at Leicester from September 8th to 11th. The presidential address (by Mr. S. B. Langlands, J.P., of Glasgow) will be delivered on Tuesday, September 9th, and during the conference the following papers will be read :—"Practical Use of a Test Room" (Messrs. W. L. Marshall, junr., and R. H. Redmill, junr.); "Modern Street Lighting by Gas" (Messrs. C. J. Winstone and W. A. Bishop; "Laboratory Experience in relation to Public Lighting" (Mr. G. Wilson and Dr. J. S. G. Thomas); "Street Lighting at Birmingham" (Mr. R. Mason); and "Candid Opinions on Street Lighting" (three unspecified speakers).

Railway Loud-speakers.

At the south end of Morden underground electric railway station sheds and sidings are provided for accommodating rolling stock used on the City line, and a considerable amount of shunting and marshalling of trains takes place there according to traffic requirements. A shunter's cabin is provided near the exit end of the car sheds, and communication between the shunter and the motormen of various trains was until recently carried out by means of a megaphone. That arrangement has been superseded by the installation of loud-speakers at four points; at three places pairs of loud-speakers are provided, each pair applying to a group of sidings, and at the fourth position there is a single loud-speaker. A microphone and amplifying set is provided in the shunter's cabin, with switches for each set of loud-speakers, so that the shunter can select the group of sidings to which he wishes to speak. The operation of the switch closes the circuits for the a.c. and d.c. supplies to the amplifier, which is a 3-stage unit with a 20-watt output valve. The filaments of the valves are lighted from the a.c. supply at 220 volts, 50 cycles. The loud-speakers are of the horn type, and they and the amplifying units were supplied by Messrs. Graham Amplion, Ltd. The d.c. supply is obtained from the a.c. circuit through a Westinghouse rectifier.

A.T.M. Totalisators.

The successful performance of the A.T.M. all-electric totalisator during the July two-day horse-race meeting at Leicester is interesting by virtue of the fact that the whole of the transportable equipment, including the lamp-indicating units, was that which had previously functioned throughout two earlier race meetings at Newmarket. The Leicester totalisator thus aptly illustrates the claims made for the equipment with regard to transportability and adaptability to various race-courses and successive meetings throughout the year. At the conclusion of the Leicester meeting, the equipment was once more dismantled and transferred to Wolverhampton in readiness for the meeting there on August 18th. Following erection on the permanent racks at Leicester the Newmarket equipment worked immediately, without re-adjustment, thus proving its ability to withstand the handling and vibration incidental to dismantling, packing, road transport by motor lorry, unpacking and re-erection, a severe test having regard to the character of the equipment. The permanent racks, cabling, &c., were installed by the Automatic Telephone Manufacturing Co., Ltd., which designed and manufactured the original equipment as used at Newmarket, the main contractors to the Racecourse Betting Control Board being the British Thomson-Houston Co., Ltd., Rugby.

Appointments Vacant.

Engineering and distribution assistant for Wolverhampton Corporation.

Mains assistant for Cannock Electricity Department.

Chief engineer and manager for Great Yarmouth Electricity Department.

General manager for Great Yarmouth Passenger Transport Undertaking.

Junior charge engineer for Portsmouth Electricity Department.

Foreman cable-jointer for the Government of the Federated Malay States.

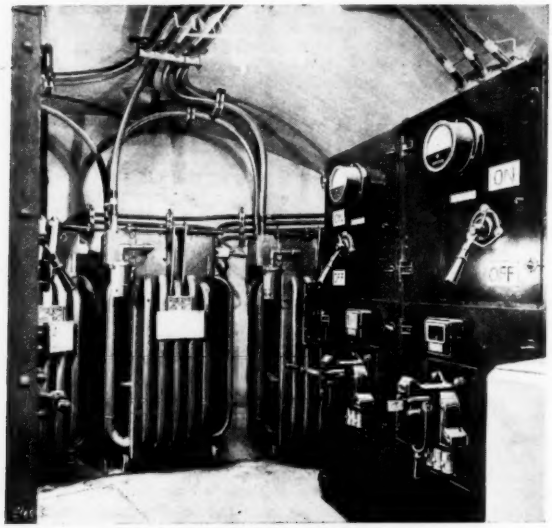
(See our advertisement pages to-day.)

Reinforced Concrete and Electrolysis.

As is well known, one of the principal objects of the cement in reinforced-concrete is to protect the reinforcing metal from the oxidation caused by humidity. It is now recognised that the protection against this form of oxidation does not meet all requirements, and that electrolytic action is also of vast importance. This aspect of the subject is discussed in *La Révue Générale des Sciences*, which gives some remarkable results of investigations. It is shown that the conductivity of cement is from 10 to 15 times greater when the cement is damp than when it is dry, that a current entering by iron in dry cement and passing out through iron in wet cement oxides the metal in the same way as if the metal were placed in the earth, and that at the point where the current returns to earth a destructive and disaggregating effect is also produced on the cement itself. Emphasis is laid on the imperative necessity of a wider recognition of the danger of allowing stray currents to circulate in walls and other parts of reinforced-concrete buildings.

Underground Sub-station in Restricted Space.

Messrs. Johnson & Phillips, Ltd., have recently completed the equipment of a 1,000-kVA underground sub-station in Trafalgar Square, London, to the order of the Charing Cross Electricity Supply Co. The sub-station is situated in the cellars of Grand Buildings and to ensure continuity of supply



The New Underground Sub-station at Trafalgar Square.

an 11,000-volt ring main is taken direct to a control board whence connections are taken to the e.h.p. transformer control cubicles of the stationary sheet-steel type, arranged for front access; it would not have been possible to accommodate armour-clad equipment or truck-type switchgear in the space available. The automatic oil circuit breakers in the cubicles have a rupturing capacity of 150,000 kVA. The transformers are arranged in two 500-kVA, 11,000 to 346/200-volt banks, each bank comprising three 166⅔-kVA single-phase units, and a spare transformer is provided for connection in circuit during overhaul of any single unit. Each transformer is fitted with a chloride breather, oil gauge and rollers, and taps are provided for voltage adjustment. From the l.p. side of the transformers cables are taken to a two-panel cubicle-type switchboard with 1,000-A oil circuit breakers and isolating switches, and on the roof of the switchboard a chamber is provided for six 1-sq. in., p.i., l.c. cables outgoing to a distribution board fixed outside the sub-station. Owing to space restrictions both in floor area and in height, the arrangement of the whole equipment called for the exercise of a considerable amount of ingenuity, but by the co-operation of the Supply Company's engineers with the J. & P. designers a very difficult job was brought to a successful conclusion.

Fatality.

An inquest was held on July 22nd on Thomas Card Amor, an electrician employed by Messrs. Hunt, Winterbotham and Co., Ltd., Gloucester, who received fatal injuries whilst employed at the company's mill. According to the *Western Press*, Mrs. Amor said that on July 18th her husband went to work and later came running home badly burnt, with his clothes alight Mr. F. C. Amor said that at his father's request he went to the mills and found that the insulation on the transformer gear was on fire. His father had started work, but he was of the opinion that his father had forgotten to switch off the current. A verdict of "Accidental death" was recorded.

Rust Preventive Plating.

A highly interesting paper on "The Resistance of Electrodeposits to Corrosion, with Special Reference to Cadmium and Zinc," was recently presented by Dr. W. S. Patterson before the Electroplaters' and Depositors' Technical Society. It describes some important work carried out by the author on the relative resistance of cadmium and zinc plating to corrosion, and his findings are likely to be of considerable interest to those who are industrially concerned with coating processes for the prevention of rust on ferrous materials. The results of the research indicate that both cadmium and zinc form excellent protective coatings for appliances which are to be used for indoor work. The choice between the two coatings, always provided they are initially sound, can be made without any serious regard for their corrosion-resisting properties; both should be durable and satisfactory. For outdoor exposure, or severe indoor exposure in highly saturated atmospheres, there appears to be a strong case for zinc in preference to cadmium. So far as the author has ascertained, cadmium is, however, largely used in practice for the first type of work and, as already stated, it is in that connection quite satisfactory. Finally, one would suggest that more should not be read into the foregoing research than is intended; much damage has been done, both to the study of corrosion phenomena and to the faith of practical users of metal appliances, by statements that are correct in their context, but which are gross exaggerations when mis-stated within the context.

A Warning.

We are given to understand that a sharp-featured clean-shaven German calling himself Baron Axel von Oetzen, who is about 50 years of age, 5 ft. 7 in. in height, and grey haired, has obtained a first-class railway season ticket available between London and Birmingham in the name of Mr. G. W. Molle, B.Sc. (Eng.), A.M.I.E.E., whom he is apparently trying to impersonate. Readers are accordingly warned to be on their guard against similar attempts at misrepresentation in electrical circles.

Electricity Output in U.S.A.

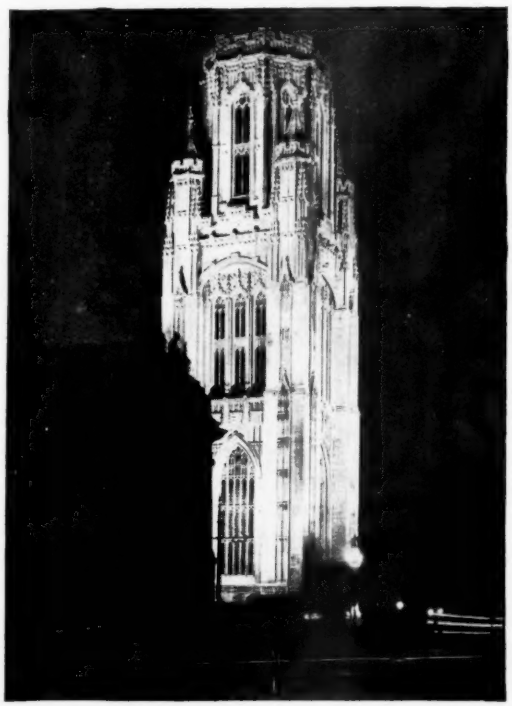
The National Electric Light Association makes available on Wednesday of each week the figures on the total production, in kilowatt-hours, of the electric light and power industry, as estimated from telegraphed information received from member companies each week-end. The totals constitute a valuable index to the business conditions of the country; they are not to be confused with the figures published monthly by the United States Geological Survey, which include, besides electric light and power plant, the output of traction enterprises and of certain factories which contribute, in whole or in part, to the public supply. The production of electricity by the electric light and power industry of the United States for the week ended July 19th was 1,631,600,000 kilowatt-hours, according to the Statistical Research Department of the National Electric Light Association, which is 3¼ per cent. below the figure for the corresponding week in 1929, but 8.8 per cent. above the output for 1928. Arranged in tabular form, the output in kilowatt-hours of the light and power companies during recent weeks has been as follows:—

Week ended—	1930.	1929.	1928.
June 28th ...	1,657,300,000	1,698,360,000	1,480,000,000
July 5th ...	1,576,300,000	1,590,250,000	1,370,000,000
July 12th ...	1,564,570,000	1,631,700,000	1,490,000,000
July 19th ...	1,631,600,000	1,687,530,000	1,500,000,000

As indicated by the production of electricity, business conditions in the country as a whole show little change from recent weeks, and the effects of the midsummer slackness are still very noticeable.

A Floodlighting Scheme.

The floodlighting of the Bristol University tower, as depicted in the accompanying illustration, created a large amount of



Bristol University Tower, Floodlighted.

admiration during recent celebrations in the city. Some 27 floodlights were used for the scheme, all of which were installed on nearby buildings, each equipped with a standard 1,000-W gasfilled lamp. The scheme was carried out by the illuminating engineering department of the General Electric Co., Ltd., in collaboration with Messrs. Winter & Co.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

Mr. J. Harcourt Williams, manager of the Manchester branch of the British Thomson-Houston Co., Ltd., whose portrait appears herewith, has been appointed deputy chief engineer to the Manchester Electricity Department in succession to Mr. A. L. Lunn. Mr. Williams was educated at Charterhouse and at the Central Technical College, London. He served an apprenticeship with Messrs. Maudslay, Son & Field, and in 1900 joined the British Thomson-Houston Co., Ltd. He was engaged on the Sheffield contract and remained on the company's construction staff until 1912 when he went to the

Mr. J. Harcourt Williams.
The new deputy-chief of the Manchester undertaking.

London office. He was appointed manager of the Manchester branch of the B.T.H. Co. in 1920. Mr. Williams has been a member of the Institution of Electrical Engineers since 1913 (associate member 1906) and was chairman of the North-Western Centre for the 1928-29 session; he is also a member of the Institution of Civil Engineers and the American Institute of Electrical Engineers.

Mr. R. E. Petley has been appointed general manager of the United River Plate Telephone Co. in Argentina. He started his career with the company as a junior clerk in the London office in 1908, and he became secretary to the London board of directors in 1923. In the spring of 1924 he went to Argentina as secretary to the local committee, and in the six intervening years has risen to assistant general manager, acting general manager, and now in furtherance of the policy of the International Telephone and Telegraph Corporation in securing the efficient and constructive administration of the telephone business in the territory served by the United River Plate Co., he is appointed general manager.

Mr. Percy G. Campling, chief engineer and manager of the Great Yarmouth Electricity Supply and Tramways Departments, has been appointed district engineer for East England by the Central Electricity Board.

The Council of the City and Guilds of London Institute has conferred the distinction of Fellow of the Institute (F.C.G.I.) upon the following: **Mr. F. M. Denton**, Fellow A.I.E.E.; **Mr. A. H. Dykes**, M.Inst.C.E.; **Mr. W. M. Heller**, B.Sc. (London); **Mr. E. M. Rich**, B.Sc. (London); and **Mr. F. F. Renwick**, F.I.C.

Mr. H. Dubbury, managing director of Messrs. Phillips and Sons (Chiswick), Ltd., who has been absent from business for a long period due to a serious illness, has now recovered and has resumed his activities.

Mr. R. E. Rogers has been appointed deputy city lighting engineer at Liverpool. He has been in the City Corporation's service for 37 years, and has been works superintendent of the Lighting Department for the past eleven years.

Mr. Walter Finlay, W.S., the solicitor and secretary to the Electrical Contractors' Association of Scotland, underwent a serious operation on August 3rd, we regret to hear. His condition is as well as can be expected.

Messrs. R. Borlase Matthews, R. D. Morrison, and **E. H. F. Reeves** have been appointed directors of the Lincolnshire Power Co., Ltd., in the place of the original directors, who have resigned. The company is promoting the Lincolnshire Electricity Special Order which embodies a scheme of rural electrification.

Mr. R. H. Patman, assistant engineer, has resigned from the Yorkshire Electric Power Company, having been appointed district superintendent to the Ayrshire Electricity Board.

Mr. G. T. Archibald, assistant controller, Central Telegraph Office, has been appointed deputy controller.

Obituary.—We much regret to learn that **Mr. J. P. Gregory**, M.I.E.E., manager of the Contract Department, of the British Thomson-Houston Co., Ltd., Rugby, passed away on Wednesday morning last. Mr. Gregory was taken ill at the Eastbourne Conference of the I.M.E.A. and after a few days entered a nursing home in Rugby where he rapidly became worse. His many friends in the municipal, company, and manufacturing world will feel the deepest sympathy with Mrs. Gregory in her sad loss.

Wills.—The late **Sir Vincent H. P. Caillard**, financial director of Vickers, Ltd., and a past-president of the Federation of British Industries, left estate valued at £92,261 (£67,436 net personalty).

The late **Mr. Joseph H. Luke**, a director of the Westinghouse Brake and Saxby Signal Co., Ltd., left unsettled property in England valued at £359.

Financial Section.

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares.

New Companies Registered.

Rota Light Sign, Ltd.—Private company. Registered July 26th. Capital, £500 in £1 shares. Objects: To carry on the business of general sign manufacturers, designers, inventors and dealers in all kinds of illuminated mechanical, electrical, revolving, swing, fixed and other signs, &c. The subscribers are: M. Tanner, 183, Sutherland Avenue, Maida Vale, W., manufacturer; E. H. Armitage, 11, Hugh Street, Victoria, S.W., engineer; R. Manning, 108a, Pritchards Road, Hackney Road, E.2, chair manufacturer. The first directors are to be appointed by the subscribers. Solicitor: A. Hunt, 24, Haymarket, S.W.1.

International Refrigerator Co., Ltd.—Private company. Registered July 30th. Capital, £50,000 in £1 shares. Objects: To carry on the business of manufacturers, importers, exporters and repairers of and dealers in all kinds of electrical refrigerators, electrical refrigerating machinery and appliances, &c. The directors are: J. J. West (managing director and chairman), Royal Stuart Hotel, Cromwell Road, S.W.1; V. J. Radbone, 268, St. James's Court, S.W.1; J. F. Stewart, 293, St. James's Court, S.W.1; J. Gray, 1, Holland Villas Road, W. Secretary, J. F. Stewart. Registered office: Crown House, Aldwych, W.C.2.

Ensign Electric Bell and Signal Co., Ltd.—Private company. Registered July 29th. Capital, £15,000 in £1 shares. Objects: To act as trustees to institute, carry on, assist or participate in financial, electrical, industrial, and other businesses, &c. The subscribers are: W. Ranson, 17, Dartmouth Street, Westminster, architect; R. Warner, 49, Queen Victoria Street, E.C.4. Secretary, R. Warner.

Economic Transmissions, Ltd.—Private company. Registered July 30th. Capital, £400 in 2s. shares. Objects: To adopt an agreement with A. M. Taylor, to acquire patents, concessions, licences, inventions, rights and privileges, to manufacture and deal in machinery and plant, to carry on the business of electricians, mechanical engineers, manufacturers and workers of electricity, motive power and light, &c. The first directors are: A. M. Taylor, Slade Lodge, Erdington, Birmingham, electrical engineer; P. H. Carter, 33, Waterloo Street, Birmingham, C.A.; W. Reilly, Elmhurst, Four Oaks, Sutton Coldfield, engineer. Secretary, A. M. Taylor. Registered office: 33, Waterloo Street, Birmingham.

Official Returns of Electrical Companies.

Langham Radio, Ltd.—C. C. Lyon, 69, Leadenhall Street, E.C., was appointed receiver and manager on July 21st, 1930, under powers contained in debenture dated February 27th, 1930.

Welding Appliances, Ltd.—Capital, £1,000 in £1 shares. Return dated April 4th, 1930. All shares taken up. £1,000 considered as paid. Mortgages and charges, nil.

Womersleys Electric Co., Ltd.—Capital, £1,000 in £1 shares. Return dated May 15th 1929 (filed May 7th, 1930). 230 shares taken up. £230 paid. Mortgages and charges, nil.

G. H. Stevens & Co., Ltd.—Capital, £600 in £1 shares. Return dated April 9th, 1930. 502 shares taken up. £502 paid. Mortgages and charges, nil.

John Richards & Co. (Electrical Engineers), Ltd.—Capital, £6,000 in £1 shares. Return dated January 17th, 1930. 4,802 shares taken up. £2 paid. £4,800 considered as paid. Mortgages and charges, nil.

Energy Syndicate, Ltd.—Capital, £25,000 in 12,000 preference and 13,000 ordinary shares of £1 each. Return dated December 31st, 1929. 11,972 preference and 12,724 ordinary shares taken up. £24,696 paid. Mortgages and charges, nil.

E. H. Maisner & Co., Ltd.—Capital £1,000 in £1 shares. Return dated May 22nd, 1930. 490 shares taken up. £490 paid. Mortgages and charges, nil.

Elstree Radio, Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1929 (filed March 8th, 1930). 4 shares taken up. £4 paid. Mortgages and charges, nil.

Essaness Radio & Electrical Co., Ltd.—Satisfaction to the extent of £500 on June 26th, 1930, of debentures authorised February 5th, 1928, and registered March 6th, 1928.

R. J. Richardson & Co. (London), Ltd.—Particulars filed of £200 debentures authorised July 8th, 1930, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £100.

Kinetic Wireless & Electric Supplies, Ltd.—Mortgage dated July 14th, 1930, to secure £1,346 8s. and further advances, charged on land, shop, &c., at Warlingham, Surrey. Holders: Halifax Building Society.

Gorseinon Electric Light Co., Ltd.—Capital, £60,000 in £1 shares. Return dated April 3rd, 1930. 57,000 shares taken up. £57,000 paid. Mortgages and charges, nil.

Central Electric Supply Co., Ltd.—Capital, £350,000 in £5 shares. Return dated February 25th, 1930. 65,000 shares taken up. £100,000 paid. £225,000 considered as paid. Mortgages and charges, £384,340.

Weldrics (1922), Ltd.—Capital, £25,000 in £1 shares. Return dated April 2nd, 1930. 15,500 shares taken up. £13,925 paid. £75 calls unpaid. £1,500 considered as paid. Mortgages and charges, nil.

County Wireless Services, Ltd.—Capital, £500 in 400 preference and 100 ordinary shares of £1 each. Return dated April 25th, 1930. All shares taken up. £470 paid on 400 preference and 70 ordinary shares. £30 considered as paid on 30 ordinary shares. Mortgages and charges, nil.

N.E.S. (Bradford), Ltd.—Capital, £1,500 in £1 shares. Return dated March 21st, 1930. 1,100 shares taken up. £900 paid. £200 considered as paid. Mortgages and charges, nil.

Bordesley Electrical Accessories Co., Ltd.—Capital, £5,000 in £1 shares. Return dated March 24th, 1930. 4,812 shares taken up. £2,500 paid. £2,312 considered as paid. Mortgages and charges, £1,434 16s. 2d. (bank overdraft).

City Notes.

Nigerian Electricity Supply Corporation, Ltd.

The first annual meeting was held on July 30th, the Hon. Lionel Holland (chairman) presiding. In presenting the report and accounts the chairman said that on May 12th last the power installation at the Kurla Falls, which the Corporation had been formed to complete and to work, had been officially inaugurated by the Lieutenant-Governor of Northern Nigeria. The total sum expended upon construction work, equipment and plant up to the close of the financial period, including similar expenditure before the Corporation took over the property and work, had been £324,636. The installation now completed consisted of three units of 2,000-h.p. capacity each, one being held as a standby so as to maintain 4,000 h.p. in operation. Within two months the Corporation would be in a position to generate and deliver the full 4,000 h.p., and on that basis it had been estimated that its yearly revenue would exceed £90,000, to be considerably increased when later provision was made for a larger supply of power. The revenue was legally assured by long-term contracts with leading mining companies, but owing to the recent fall in the price of tin, they had determined upon certain concessions which they hoped would afford the mining companies substantial relief. They still anticipated, however, that the balance of revenue would be sufficient to meet the fixed dividend upon the preferred ordinary shares and provide for the required annual contribution out of profits to a sinking fund. The report and accounts were adopted.

Oliver Pell Control, Ltd.

The accounts for the year ended March 31st last show a profit of £9,112, after providing for income tax and depreciation (against £8,747 in 1928-29). To this is added £3,876 brought forward, making £12,988. The interim preference dividend and a special advertising outlay are deducted from this, leaving £4,679 to be carried forward. Last year 5 per cent. was paid on the ordinary shares but the directors (who hold 75 per cent. of the ordinary capital) consider that special expenditure on an advertising campaign instead of paying an ordinary dividend was in the company's best interests. It is expected that the results will fully justify their decision. The turnover increased by over 17 per cent. and the gross trading profit by about 27 per cent.

Yorkshire Electric Power Co.

The directors have declared interim dividends on the preference and ordinary capital at the rate of 6 per cent. per annum for the half-year ended June 30th. Despite adverse trade conditions, particularly in the woollen textile industry, there has been a substantial increase in the amount of electricity sold during the past half-year as compared with the corresponding period of 1929. The mains and sub-stations of the company have been extended during the half-year to meet new demands, and contracts have been placed for the extension of the Thornhill power station. The Electricity Commissioners have made an Order giving the company authority to supply electricity for all purposes in the urban district of Silsden and have submitted it to the Minister of Transport for confirmation.

Electrical Distribution of Yorkshire, Ltd.

The directors have declared an interim dividend for the half-year ended June 30th at the rate of 9 per cent. per annum. During the past half-year there has been a large addition to the number of consumers and a substantial increase in the demands made upon the company for electricity compared with the corresponding period of last year; the increased use for heating, cooking and other domestic purposes is very marked. Mr. W. B. Woodhouse, who has been the engineer and manager of the company from its formation, has been appointed a director to fill the vacancy on the board.

Urban Electric Supply Co., Ltd.

With reference to the recent creation of 250,000 ordinary shares of £1 each, it is announced that 70,000 of these have been issued to Edmundson's Electricity Corporation, Ltd., at the price of 30s. per share, in consideration of the transfer of not less than 90 per cent. of the capital of six companies operating in Cornwall to the Urban Company, and in consideration of the advances and debts owing by the six companies. The balance of the shares (180,000) is offered to the Urban Company's shareholders at the price of 26s. each and Edmundson's have agreed to take up at this price any shares not purchased by the shareholders. The new shares will rank *pari passu* with the old ordinary shares.

Wellman Smith Owen Engineering Corporation, Ltd.

Presiding at the annual meeting on July 31st, Mr. J. Foster-Smith said that during the year under review the improvement in the company's position continued and steady progress had been made. The policy of consolidating their business abroad had proved of great benefit, and the amount of work they had in hand at present for shipment and for installation in the Empire overseas and on the Continent of Europe greatly exceeded the value of the contracts in hand for the home market. Their subsidiary company in South Africa was now definitely established on a trading basis, and contracts to a substantial value had been carried out in that territory. The report and accounts were adopted.

Whitehall Electric Investments, Ltd.

Speaking at the recent annual meeting, the Hon. Clive Pearson (chairman) said, with regard to the electrical enterprises in Devon and Somerset, that it was planned to link these undertakings and to extend their services both in urban and rural areas. The year under review had been devoted to preliminary work, and good progress had been made in obtaining statutory orders, in arranging for the bulk supply of power, in modernising the existing distributing systems, and in obtaining wayleaves. Regarding the Greek investment there was at St. George's Bay a modern station of 45,000-kW capacity. The transmission system, however, still required considerable expenditure in order to meet the growing demands of Athens, and they had acquired, in conjunction with the Prudential Assurance Co., controlling interests in the Société Electrique de Production, the Société Electrique de Distribution, and in the Société Electrique des Transports.

Thomas de la Rue & Co., Ltd.

Presiding at the recent annual meeting, Mr. S. Lamert (chairman) said the gross profit on trading account was £39,232, which compared with £50,815 a year ago. They were having the greatest difficulty in maintaining their turnover. Theirs was a solid business, however, and was capable of standing up to such a commercial crisis as the one which they had to face. When general conditions improved they would see a substantial improvement in the business. The report and accounts were adopted.

Rees Roturbo Manufacturing Co., Ltd.

The gross profit for 1929 was £21,520, as compared with £22,416 for 1928. After providing for debenture interest, &c., there is a net loss for the year of £4,306, which has been written off against general reserve. The report states that the Rees-Stevens electrical equipment has not had the sale anticipated, and to this is due the fall in the turnover and a consequent loss in profits.

Vickers, Ltd.

The directors have declared interim dividends for the half-year ended June 30th last of 2½ per cent. on the preferred 5 per cent. stock (less tax), 2½ per cent. on the 5 per cent. preference shares (less tax), and 2½ per cent. on the cumulative preference shares (free of tax).

Associated Electrical Industries, Ltd.

At special meetings on July 30th resolutions were passed adopting a new set of articles of association and sub-dividing the £2 preference shares into two shares of £1 denomination.

Bristol Tramways and Carriage Co., Ltd.

The directors have declared an interim dividend of 4 per cent. (less tax) on the ordinary shares for the half-year ended June 30th last.

Shropshire, Worcestershire and Staffordshire Electric Power Co.

The holders of the "A" and "B" ordinary shares are offered 245,000 new "B" ordinary shares, in the proportion of one new share for each four held, at 25s. per share.

Enfield Cable Works, Ltd.

An interim dividend of 10 per cent., less tax, has been declared on the ordinary shares.

Rushden & District Electric Supply Co., Ltd.

The directors have declared an interim dividend of 3½ per cent.

Northampton Electric Light & Power Co., Ltd.

The directors have declared an interim dividend of 4 per cent. on the ordinary shares.

City of Buenos Ayres Tramways Co. (1904), Ltd.

A dividend of 1s. 3d. per share, less tax, has been declared for the quarter ended June 30th last.

Mather & Platt, Ltd.

The directors have announced an interim dividend of 5 per cent. on the ordinary shares.

American Company.

The Times reports that shareholders in Insull Utility Investments, Inc., are invited to subscribe on September 15th next for 600,000 new shares of common stock at $50 per share. The issue may be subscribed for either in cash or by instalments, but stockholders who pay for their new shares in full will receive the October dividend of 3 per cent., payable in common stock. The new stock will be offered to common shareholders on the basis of one new share for each five held, and to holders of the $5.50 prior preferred, first preferred, and second preferred stocks on the basis of one new share for each 11 now held.

Stocks and Shares.

Tuesday Evening.

The temper of investment shows no variation in its partiality for the best-class stocks and shares. Very few others seem to stand more than what may be called a sporting chance in respect of the appeal they make to the public—sporting in the (perhaps baser) sense of speculation. There is no settled trend to any of the Stock Exchange markets except in those concerned with purely investment stocks. Constant shocks to confidence in the industrial sections have rendered the investor uneasy and disturbed. He demands, in consequence, something gilt-edged, and his predilection for the safety-first securities is manifested by the manner in which prices respond to the widely-spread support now afforded to such stocks.

New Issue Strength.

Newcastle-on-Tyne Electric 5 per cent. debenture, which stood at a very small premium when dealings first started, is now 3 premium, showing a rise of 15s. on the week. The issue price was 96. Edmundsons' 5 per cent. debenture, with which the underwriters were left fairly liberally, is in active request up to 1 premium on the issue price of 93½, a gain of 12s. 6d. London Electric Railway 5 per cent. debenture is 1 higher at 2½ premium. Pirelli-General Cable Works 5½ per cent. guaranteed debenture is better at 102. The stock carries the guarantee, as to principal and interest, of the General Electric Company and the Società Italiana Pirelli, giving ample protection to the investor. The yield at the present price is £5 7s. 6d. on the money. A full half-year's interest payment will become due next New Year's Day. The stock can be bought in the form of renunciation letters, thus saving the 1 per cent. transfer stamp duty.

The Shropshire, Worcestershire and Staffordshire Electric Power Company is offering, to its "A" and "B" shareholders, new "B" ordinary shares at 25s. The new shares are offered in the proportion of one for every four "A" or "B" now held.

Cables and Wireless.

It is sometimes said in the Stock Exchange that the collapse in Cables and Wireless stocks must be considered one of the heaviest amongst the many blows struck this year at the confidence of the real investor. The 7½ per cent. "A" ordinary has shed a point during the past few business days, making a fall of 53 since the start of the present year, and to-day's price of 23½ goes against the 90½ reached very soon after the Merger became consummated. A mild speculative account sprang up in the stocks. New York was credited with the determination to acquire control of the "B" stock in which the equity of the business may be deemed—now rather pathetically—to reside. The stock also went to 90, and now is 12½. But the 5½ per cent. preference was regarded, all along, as a sound security, possessed of a semi-Government flavour, and the collapse of this impression has hit, very hardly, the genuine investor. There is reasonable hope, of course, that the present disappointment will be amply compensated by the subsequent course of events. The position hinges entirely upon trade. A revival in the international circles of industry would find immediate reflection in the traffics of Cables and Wireless, the shareholders in which are far from singular in their earnest expectation of trade improvement.

Japanese Telephones.

It is stated that the Japanese Ministry contemplates the formation of a semi-official telephone corporation, with a capital equivalent to 80 million pounds sterling, to handle the non-operating side of the telephone system. The suggestion is that the Japanese Government shall contribute half the required amount in property, the other moiety, in money, being provided by private sources.

Tokyo Electric 6 per cent. bonds, it may be added, are unchanged at 92.

Electricity in Yorkshire.

On former occasions, mention has been made of the remarkably successful manner in which the Yorkshire companies forge ahead in face of all the handicaps imposed by depression in the industries upon which the county mainly depends. Again the Yorkshire Electric Power Company announces progressive figures in the amount of power sold during the past half-year. The interim dividend is repeated at 3 per cent. actual, implying that the usual 8 per cent. for the year will be forthcoming. The yield on the money at the present price of 31s. 3d. is 5½ per cent. The Electrical Distribution Company of Yorkshire declares an interim dividend of 4½ per cent., the same as that of a year ago, and the price has hardened to 34s. 6d. At this, the yield to an investor, on the basis of the 9 per cent. dividend, comes to £5 4s. 4d. per cent. Both these Yorkshire companies have been increasing their capitals during the past few years in order to cope with the demands made upon their services. The Electrical Distribution of Yorkshire draws attention to the extended use now made of electricity for heating, lighting, and other domestic purposes.

Urban's New Shares.

Apart from small declines in the prices of Lancashire Light and Power to 24s. 6d., and in Newcastle-on-Tyne ordinary to 22s. 6d., the list of prices in this section would be very undis-

tinguished were it not for the interest aroused in Urban Electric ordinary shares. The latter, at 28s. 9d., are quoted ex the rights to the new shares. Three weeks ago, and as mentioned here at the time, the Urban Electric took steps to acquire 90 per cent. of the shares in half-a-dozen Cornish electric supply undertakings. It is now announced that 52,253 new Urban ordinary shares have been issued to Edmundsons' Electricity Corporation, at 30s. each, in consideration of the transfer by Edmundsons' of not less than 90 per cent. of the shares of these six companies, at cost price. A further 197,747 new ordinary are to be created, of which 180,000 are being offered at 26s. to Urban shareholders.

Manufacturing Companies' Shares.

British Electric Transformer preference shares are left unchanged at 8s. 9d., in spite of a very poor report, of which the details were given in the last number of the Electrical Review, page 191. The annual meeting, due to be held on Wednesday in this week, was awaited with keen interest by proprietors who hoped to hear more about the outlook than was contained in the report. British Aluminium ordinary have eased off to 38s. 9d., showing a fall of 9d. The Duke of York paid a visit a few days ago to the township of Fort William, where the British Aluminium Company has opened its new works as a result of the Ben Nevis water-power scheme. G.E.C. ordinary are 6d. lower at 49s. 6d. Associated Electrical Industries are 9d. down at 23s. 9d. on a little selling from New York. Edison-Swan first preference at 26s. 3d. have gained 1s. 9d.; the 5 per cent. debenture stock remains without alteration at 84½. Enfield Cable ordinary are 4⅛, the declaration of the usual interim dividend of 10 per cent. not affecting the price. Brush ordinary has declined 3 to 112½

Railway Stocks.

The character of the weather that prevailed around London over the August Bank Holiday was too mixed for hopes to be entertained in the matter of traffic records being broken. Stock Exchange prices of the electric railway stocks have undergone no change. Those of the steam railways recovered to a partial extent after further heavy falls by reason of diminished earnings. It may be worth noting that while Metropolitan Districts stand at 76, London Electric ordinary is quoted at 72. The conditions applying to both stocks are very much the same, and the only reason for the discrepancy is the fact that in Districts there is a freer market, the Stock Exchange value of which nobody will challenge. While the expense involved in a "straddle" would render an exchange of the stocks hardly worth while, the prospective purchaser of Districts will find London Electric Railway stock to be equally well-placed, as regards the dividend outlook, and to be several points the cheaper of the two.

Yields on American Shares.

As giving some idea of the yield-capacity of shares in American-Canadian companies dealng with utilities, it may be observed that American Telephone & Telegraph return a trifle under 4 per cent. at their present price of 220. International Telephone & Telegraph pay 4 per cent. at 50. Pennsylvania Water & Power, at 76½, give £3 5s. 6d. Shawinigan Water and Power common, at 70, pay £3 11s. 5d. Montreal Light, Heat & Power Consolidated, now quoted in their guise as new shares, return 2½ per cent. at 60. "Sidro" participating preferred shares yield 2¾ per cent. Consolidated Gas, Electric Light & Power of Baltimore, at 120, pay 2½ per cent. Canadian General Electric 7 per cent. preferred shares, of 50 dollars each, return £5 11s. at 63, and Calgary Power common, at 160, offer £3 15s. per cent. These illustrations point to the hopefulness with which utility companies' shares are regarded in America.

British Shares and Yields.

It is of interest—and possibly of service—to match the yields mentioned in the preceding paragraph against those obtainable from shares in British companies. The returns available from the latter are, as a whole, higher than the American shares afford, as reference to our price-lists and tables will indicate. But, compared with the income per cent. that can be obtained from shares in a good many sections of the industrial market, the return upon sound British electricity supply shares is sufficiently modest to point the respect with which investment regards them. The yields upon shares in the best-class manufacturing and equipment companies are flattering equally to the prudence and the management that have placed the shares of the companies upon a purely investment basis.

Miscellaneous Matters.

Mexico Tramways shares have shed several points, dropping to 13¼. Mexican Light & Power have lost 4, at 65½. Brazilian Tractions are dull at 38⅛. Hydro-Electrics fell 1⅜ to 38¼, and International Holdings weakened to 4 5/16. Amongst the Indian shares, Calcutta Electric Supply have been lowered to 45s. 9d. Of miscellaneous issues, Atlas ordinary keep at about 25s. 6d., British Light & Power at 13s. 3d. Rubber shares are depressed: the iron and steel group shows no change.

Dealings are about to start in the 5 per cent. second debenture stock of the North Metropolitan Power Station Co., Ltd. The security of the stock is exceedingly well-protected, and the price is moderate.

Share List of Electrical Companies.

Home Electricity Companies.

	Nom. £	Approx. Dividend. 1928.	1929.	Price Aug. 5 1930.	Rise or fall	Yield p.c.
Bournemouth and Poole	1	15	15	67/6	—	5 4 3
Brompton Ordinary	1	8½	8½	26/6	—	5 5 8
Charing Cross Ordinary	1	8½	8½	28/-	—	5 0 0
do. do. 4½% Pref.	1	4½	4½	18/-	—	5 0 0
Chelsea	1	8½	8½	26/6	—	5 5 8
City of London	1	10	10	33/9	—	4 8 1
do. do. 6% Pref.	1	6	6	23/-	—	5 4 4
Clyde Valley	1	8	8	38/3	—	4 3 9
County of London	1	7	10	4*/-	—	4 9 0
do. do. 6% Pref.	1	6	6	23/-	—	5 4 4
Edmundson's 7% Pref.	1	7	7	24/-	—	5 16 8
Elec. Supply Corporation	1	11	11	48/3	—	4 11 3
Kensington Ordinary	1	8	8	27/-	—	5 3 8
Lancs. Light and Power	1	7½	7	24/6	—6d.	5 14 3
London Electric	1	8½	9	29/6	—	4 15 0
Metropolitan	1	9	10	40/-	—	5 1 3
do. 4½% Pref.	1	4½	4½	17/-	—	5 6 0
Midland Counties	1	6½	7	27/6	—	5 1 10
Mid. Elec. Power	1	15	8	31/3	—	5 2 5
Newcastle-on-Tyne Ordinary	1	6	6	22/6	—⅛	5 6 8
do. 7% Pref.	1	7	7	26/-	—	5 7 8
Notting Hill 6% Pref.	10	6	6	10½	—	5 11 4
North Met. Elec. 6% Pref.	1	6	6	22/6	—	5 5 9
St. James' and Pall Mall	1	8	8	27/6	—	5 1 10
Scottish Power	1	8	8	28/-	—	5 14 4
South London	1	8½	8½	27/6	—	5 1 10
Urban Ordinary	1	7	7	28/£xr	—	3 12 4
Westminster Ordinary	1	8½	8½	27/-	—	5 3 8
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	24/6	—	6 2 5
Yorkshire Elec.	1	8	8	31/3xd	—	5 2 5

Home Rails.

Central London Ord. Assented	Stock	4	4	77	—	5 4 0
Metropolitan	,,	3½	4	67½	—	5 18 6
do. District	,,	4	5	76xd	—	6 11 7
Underground Electric	£1	7	8	23/6xd	—	6 16 2
do. do. Income	Bonds	6	6	105	—	5 14 3

Telegraphs and Telephones

Anglo-Am. Tel. Pref.	Stock	6	6	99½	—	6 0 8
do. Def.	,,	1½	1½	24	—	6 5 0
Automatic Telephone	1	10	12½	35/-	—	7 2 10
Cables & Wireless 5½ Pref.	Stock	—	5½	77½	—	7 2 0
do. A 7½ Ord.	,,	—	—	23½	—1	... ...
do. B Ord.	,,	—	—	12½	—	... ...
Globe Tel. and T. Ord.	10	10	10	16	—	*6 5 0
do. do. Pref.	10	6	6	10½	—	5 11 7
Great Northern Tel.	10	20	20	29½	+½	6 15 7
Marconi-Marine	1	12½	15	39/6	—	7 12 0
Oriental Telephone Ord.	1	12	12	52/6	—	*4 11 3

Home and Foreign Trams, &c.

Anglo-Arg. Trams First Pref.	5	5½	5½	2	—⅛	13 15 0
do. do. 2nd Pref.	5	6	6	2	—	15 0 0
do. do. 5% Deb.	Stock	5	5	66½	—1	8 5 4
British Electric Traction Def. Ord.	,,	5	5	1500	- 25	... ...
do. do. Pref. Ord.	,,	8	8	123½	—	6 6 6
Brazil Traction	100	7	8	38½xd	—1½	5 4 0
Brit. Columbia Elec. Rly. Pcs.	Stock	5	5	91½	—	5 9 8
London & Sub. Trac. 5% Pref.	1	Nil	Nil	9/-	—	... ...
London United Tram Deb.	Stock	4	4	50½	—	7 18 4
Mexico Trams, 5% Bonds	—	5	5	59	—	8 9 8
Mexican Light Common	100	Nil	Nil	65½	—4	... ...
do. 7% Pref.	100	7	7	76½	—	9 3 0
do. 1st Bonds	—	5	5	79	—2	6 6 7
Victoria Falls Ord.	1	15	15	59/6	+9d.	5 0 10
Yorkshire (West Riding)		Nil	Nil	5/-	—	... ...

Manufacturing Companies.

Assoc. Elec. Ord.	1	6	6	23/9	—9d.	5 1 1
Babcock & Wilcox	1	13	15	55/-	—	*5 9 1
British Aluminium Ord.	1	10	10	38/9	—9d.	5 3 3
British Elec. Transformer Pref.	1	7	7	8/9	—	... ...
British Insulated Ord.	1	15	15	3¹¹/₁₆	—	4 1 4
Brush Ord.	Stock	10	10	112½	—3	8 17 10
Callenders	1	15	15	3⅜	—	4 5 9
do. 6½% Pref.	1	6½	6½	23/9	—	5 9 5
Crompton Parkinson Ord.	5/-	—	30	23/9	—	6 6 4
do. 8% Pref.	1	8	8	25/9	—	6 4 3
Edison-Swan 1st. Pref.	1	7½	7½	26/3	+1/9	5 14 3
do. 5% Deb.	Stock	5	5	84½	—	5 18 4
Electric Construction	1	5½	5	12/-	—	8 6 8
Enfield Cable Ord.	1	20	20	4½	—	4 16 10
English Electric	1	Nil	Nil	15/-	—	... ..
do. do. Pref.	1	3	Nil	11/3	—	... ...
Gen. Elec. Pref.	1	6½	6½	24/3	—	5 10 7
do. Ord.	1	10	14	49/6	—6d.	5 13 2
Henley	1	25	30	6xd	—	5 0 0
do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India- Rubber	1	Nil	Nil	7/6	—	... ...
Johnson & Phillips	1	10	10	1¾	—	5 6 8
Siemens Ord.	1	7½	7½	22/-	—	6 16 4
Telegraph Construction	12	10	10	17½	—	*7 0 10

* Dividends paid free of Income Tax.

The World Power Conference.

The Second Plenary Meeting held at Berlin.

By OUR SPECIAL COMMISSIONER.

No. 7.*—*Continuation of extracts from, and comments on, selected papers of electrical interest submitted and discussed by delegates.*

Telephone Line Interference.

The second part of Section 21 deals with interference of power circuits with signalling circuits. The conflict between weak-current installations and power-current systems which had gradually made enormous strides, both technically and politically, has again been complicated by the ever-growing number of wireless installations and the increasing sensitivity of the apparatus installed. Already disturbances in the proper transmission of musical tones are making themselves felt, and the question arises as to what steps must be taken to prevent interference with radio receiving sets, either by new power installations, extensions to old ones, or even by the existing ones. It is obvious that some of the remedies applied by common consent between telephone interests and power interests, such as removing one or other of the lines to a plane outside the zone of influence, cannot be resorted to. The suppression of the higher harmonics in power systems and devices for making radio sets less sensitive to their influence have yet a lot of ground to cover. In connection with this it is interesting to note that legal precedent has already occurred in France in a quite recent case in which an injunction was obtained against the owner of a defective vacuum cleaner which interfered with a private wireless receiver in a neighbouring flat. The case may be a small one, but it shows the trend of opinion.

Power in Coal Mines.

Section 6 of the Conference was devoted to the costs and comparative efficiencies of different forms of energy from the consumers' point of view. Seven papers were presented at this Section, which, summed up by the general reporter, resolve themselves into the question: "What is the most economical form of energy?" He also practically gives the answer by stating that "this is a question alone capable of occupying the entire attention of a future World Power Conference."

The Conference concentrated its contribution to this subject mainly on the relative merits of different forms of energy for use in coal mines and in industrial heating. Obviously the choice of a given form of energy depends upon factors many of which are outside the control of the power engineer, and is governed by such considerations as local conditions, locality, Government regulations, and available supplies. In spite of these governing factors being of a very widely different character in different parts of the world, it is rather interesting to note that in the case of energy supply to coal mines, the general opinion is that, with the exception of cutters and drills of the percussion type, the electrical drive offers many economical advantages, as compared with its chief mining competitor—compressed air.

Paper No. 400 on some compared results in the working of mines by electricity and compressed air is rather interesting, as it emanates from France, where the legislative restrictions against the use of electricity in fiery mines are particularly severe. This fact has allowed the authors to draw statistical comparisons of results obtained from two mines which work under almost identical conditions, with the exception that the one is electrified, whilst the other is worked with compressed-air plant.

Coal-mining operations in Czecho-Slovakia have provided the authors of paper No. 86 with similar experience. In their particular case the results are even more strictly comparable, as they refer to a mine converted from compressed-air operation to mixed working. The working results show a saving of 4.3 pence per ton for hauling and loading alone, so that the economic prospects are regarded by the authors as distinctly promising.

American experience runs along the same lines, and in paper No. 230 on compressed air *versus* electricity in the coal mines of America, the authors state that the savings effected by electricity amount to far more than 50 per cent. of the costs entailed by the use of compressed air. One figure quoted in connection with haulage, upon which the saving is shown to be of the order of ten cents per ton hauled, is of particular interest when taken in conjunction with the figure quoted in the case of mines in Czecho-Slovakia. Although the countries are widely separated, and local conditions are very different, the similarity of the figures given in terms of the savings effected is very striking.

One other point brought out in this paper is of interest when legislative regulations prevailing in France, as quoted earlier, are considered. The authors of the American paper state "that electrical operation may be considered as no more dangerous nowadays, even in fiery mines, than the use of explosives and coal-cutting machinery in sulphurous localities."

Industrial Heating.

Turning to the question of industrial heating, it is rather surprising that in this field, where there has been, and still is, more subject for controversy than in almost any other, only one paper was presented, and that on a very special, although important, branch. The paper referred to (No. 76) is by Sir Robert Hadfield and Mr. R. J. Sarjant, on "The Relative Places of Gas and Electricity in Industrial Heating." It treats the subject not only from the limited point of view of the cost of energy only, but also from the quality of the furnace set, suitability, ease of control, and maintenance. Test results on furnaces are given, and special reference is made to the development of the high-frequency furnace. The remainder of the paper is somewhat outside the scope of the electrical engineer, and deals more with the use of heat-resisting steels in the construction of furnaces, and other points of more particular interest to the steel producer.

* For Nos. 1 to 6 of this series see Elec. Rev. June 27th, July 4th, 11th, 18th and 25th, and August 1st.

The "Swedish Hour."

The general addresses given at the end of the day's technical meetings concluded with "the Swedish Hour," during which Dr. A. F. Enstrom delivered a lecture on "Mechanical Power as a Factor in Culture," in which he analysed the effects of modern industrial conditions upon mankind as a whole, with particular reference to the operative worker.

If, he states, we required to maintain the modern standard of living, without the supply of mechanical power, it would, according to an American statistician, necessitate the employment of a contingent of 125 slaves for every man, woman, and child. Mechanical power, however, does exist, and if the annual production of all stationary and motive prime movers is expressed in terms of kilowatt-hours, the resultant total is of the same order as the average world harvest of the principal kinds of grain expressed in kilograms. Thus, for every kilogram of grain that is consumed, an average of one kilowatt-hour of mechanical energy is expended.

The question then arises, what has man gained by having this addition of kWh's to his sustenance? Is he better off than before? Is he happier? Or, on the contrary, is "The good old times" theory justified?

The most outstanding feature of the use by man of an ever-increasing amount of power is the mechanisation of industry. What has been the effect of this on his habits, his outlook on life, and his pleasure? The foremost, perhaps the most tangible, effect has been the reduction of the number of hours of muscular effort, from a day with no other change than the night's sleep to the present comparatively light amount of muscular effort expended in an eight-hour-day, leaving the rest of the day at his own disposal.

Although the result has been the obtaining of better conditions of life in every respect, it is objected that the worker of to-day is not so contented as his prototype, the alleged reason being that he has lost the joy of work. If analysed, it will be realised that man has always rebelled against being forced to work. The majority have reached the point of tolerating work. Only a minority have discovered that there is something called the joy of work. It was so before, and it is so now. Have the relative percentages of these three categories of worker varied under modern conditions? If it has, the lecturer does not think that the last category has become any less.

The conditions of life have become much more favourable than they were, and the possibility of discovering the pleasure of work are probably much greater than they ever were before. The difference is that man has not yet grasped the full meaning of the change that has taken place, and does not, on the average, fully realise that there are to-day far more opportunities for bringing into operation the mental faculties he possesses instead of the muscle that was required in the past. There lies in the use of these faculties countless opportunities of finding joy in the work of this mechanised era, if only man will take advantage of them. If the complaint is made that machine production destroys the soul, it can be strongly emphasised that the fault lies not in the machine, but in the foolish human being himself, who has not yet discovered what the machine can really do for him.

Mechanisation of work is blamed for the tendency of the modern craving for enjoyment, which is attributed to the need for a counterbalance to the monotony of work. It is an excuse of human frivolity; such a counterbalance would have been more justified under the older conditions, but they did not allow of sufficient leisure for that or for any other purpose.

One other aspect of the influence of the machine which has apparently never been taken into account by those who complain of present conditions, is that the modern machine increases the demand for knowledge, especially technical knowledge. The more complicated the mechanical aid becomes the greater the demand for knowledge grows. Mere operation of machines forces the man of to-day to a greater exercise of his powers of observation. Will not an influence of this kind make itself felt throughout the generations, resulting in a general raising of the basic mental powers and the powers of observation? This is noticeable even to-day in the way the younger generation grasps with ease the construction and mechanism of a motor-car or a wireless set.

The author concludes that the assertion that mechanisation of industry leads to the eradication of the joy of work is a misinterpretation of the facts of the case. Far from being a curse, it is a factor which is capable of carrying man forward and upward if he only understands what is best for him.

Combined Heat and Power Plant.

The last day's proceedings included two sectional meetings in the morning, followed in the afternoon by the presentation of the final report by the Conference Committee.

The morning's meetings were devoted to the presentation of papers dealing with combined heat and power supply plant on the one hand, and on the other switchgear, including automatic control appliances for power stations, and remote metering and signalling apparatus. Taking the former section first, a total of fifteen papers was presented. They may be roughly divided into two sections: those based upon the use of waste heat from metallurgical works, converted into electrical energy, and distributed partly through a local network and partly through a power company's network; and those based upon the combined production of electrical energy, distributed through a private network, and the production and distribution of steam for heating purposes. Several other papers were presented on the same subject, but with limited conditions, such as paper No. 3, which gives a general survey of the combined steam and electricity producing plant of some of the German railways.

Railway operation and maintenance demands in addition to electricity for lighting and power purposes, a certain amount of steam for heating and power, for which purpose electricity cannot be used so expediently. This paper describes a combined supply plant, and gives load curves where the equalisation of load factor frequently carried out through public electricity supply stations is shown.

Paper No. 384 is typical of those dealing with the production of electricity and industrial steam. One of the main points brought out is that if industrial steam at pressures of from 1,200 to 1,400 lb. per sq. in. were used, it would be possible to produce an additional 10 billion kWh per annum from this source. A rather large discount must be allowed on this figure, owing to the location of various industrial plant being such that the commercial production of electricity for public distribution would not be profitable.

Paper No. 353 is a very good example of information based on the running experience of a complete electrical network interconnecting a number of metallurgical works between themselves and the interconnection of this network with the public supply company's mains. This paper, by Mr. A. Evain (France), is in many respects a continuation of the paper presented to the Institution of Electrical Engineers by the same author.

Papers Nos. 404, 376, 247, 242, and 413 all fall into the same category as the above paper; practically speaking, they only differ in as much as they are based on varying local conditions and that their authors have treated slightly different aspects of the same subject. The general conclusion is that when industrial steam is required the higher pressures already in use in America and now being introduced into Germany will make the joint production of electricity and steam a more profitable proposition, and will to a large extent provide a solution to some of the admitted disadvantages due to the extreme centralisation of the generation of electrical energy for public distribution purposes.

Standardised Wiring Accessories.

Ranges of fittings for common use with the various classes of wiring systems of the members of the Cable Research Committee have been put on the market.

AS a result of joint research by, and the interchange of experience between, the individual firms comprising the Cable Research Committee, complete ranges of new and improved accessories have been standardised and made available for use with all the wiring systems of the various classes of the members. The fittings have been specially designed to effect economy of time in their installation. Further, it will not be necessary for any contractor to stock more than the one type of accessory to use with any particular type of cable.

The companies and wiring systems concerned are as follows: British Insulated Cables, Ltd.—"Helsby" twin wiring system, "Helsby" bond wire system, and "Helsby" c.t.s. wiring system; Callender's Cable & Construction Co., Ltd.—"Kaleeco" wiring system, "Kalibond" wiring system, and "Callender" c.t.s. wiring system; Enfield Cable Co., Ltd.—"Enfield" twin wiring system, "Enfield" bond wire system, and "Enfield" c.t.s. wiring system; W. T. Glover & Co., Ltd.—"Glover's" wiring system, "Glover's" bond wire system, and "Glover's" c.t.s. wiring system; W. T. Henley's Telegraph Works Co., Ltd.—"Henley" wiring system, "Bondit" wiring system, and "Nomet" wiring system; The Macintosh Cable Co., Ltd.—"Macintosh" wiring system, "Macomet" wiring system, and "Macobond" wiring system; St. Helens Cable & Rubber Co., Ltd.—"St. Helens" c.t.s. wiring system, and "St. Helens" lead-covered wiring system; The Union Cable Co., Ltd.—"Unibond" wiring system, and "Dagenham" wiring system.

These standardised accessories, whilst retaining the best features of each company's speciality, embody improvements which are generally covered by patents and design registrations.

The following notes relate to the principal features of each class of wiring system. For the metal-sheathed wiring systems without bonding conductors the joint boxes are of sound and substantial construction, each consisting only of the base, cover and bonding clamps. The clamps are arranged inside the box, and are of a novel form, ensuring ease and speed for insertion of the wires. The covers are securely held in position, without introducing centre screws or other devices which tend to restrict the free wiring space inside the box. The joints and bonding can be readily inspected by simply removing the cover, without removing any screws or disturbing the bonding arrangements. Alterations and additions to the connections can be easily made. The boxes will take any size of cable from 1/.044 in. to 7/.036 in., inclusive. Fig. 2 shows a small straight-through joint box for this class of wiring system. The bonding fittings used for ceiling roses, fuse boards, &c., are in many respects similar to the previous models. A new feature has been introduced throughout the range by slotting and anchoring the bridge in order to avoid loose ports. The clamp can be fitted to the cable without removing any screws. In certain instances improved provision has been made for the reception of the earthing conductor. After completion of the jointing by means of porcelain-sheathed connections, the bonding clamps are slipped into position and the bonding screws are tightened up.

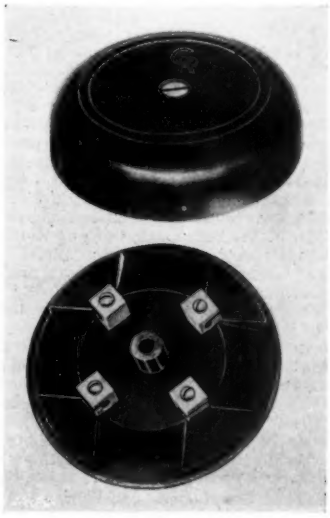


Fig. 1.—Circular Box for Non-metal-sheathed Systems.

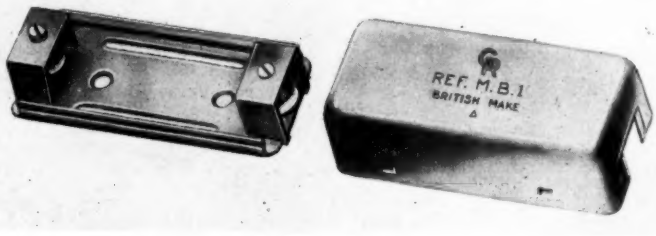


Fig. 2.—Straight-through Box for M.S. Systems without Bonding.

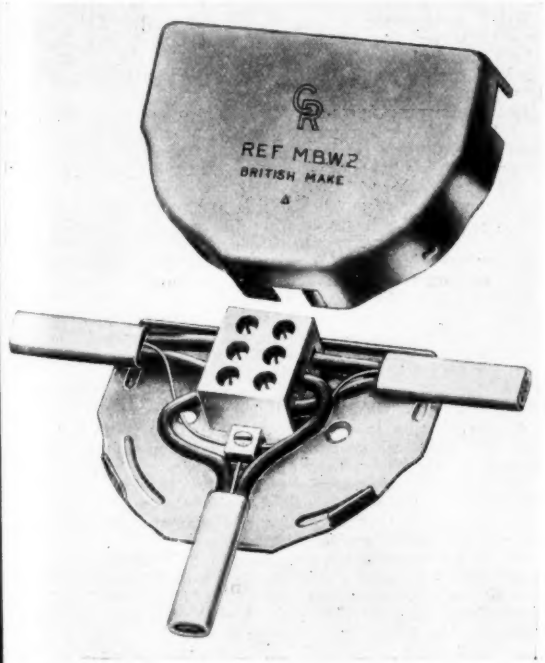


Fig. 3.—Tee Joint Box for M.S. Systems with Bonding.

The joint boxes produced for the metal-sheathed wiring systems with bonding conductors possess all the good features of the boxes designed for use with non-bonding-conductor metal-sheathed cable, except that the internal bonding clamps are replaced by a terminal pillar for the reception of the copper bonding conductor. As the bonding is carried out by means of a copper conductor incorporated in the cable, no special bonding clamps are needed for these systems. Fig. 3 shows a small tee box adopted for the metal-sheathed wire bonding systems. Porcelain-sheathed connectors are also used for these boxes. For use with distribution fuse boxes for connecting together the earthing conductors a continuity bar is available. This is made of tinned brass and is fitted with grub screws for securing the bonding conductors.

The joint boxes for the non-metal-sheathed wiring systems using c.t.s. or "Maconite" cables are soundly constructed from high-grade bakelite and embody fixed terminals. The entries are filleted in order that the space for a particular cable need not be made larger than necessary, and the contour of the lid has been modified in order to give a neat appearance. A circular joint box for the non-metal-sheathed wiring systems is depicted in fig. 1. The boxes proper are claimed to possess excellent insulating properties, and to be non-hygroscopic and fire resisting. They are black in colour, glossy in finish, and neat in appearance, and the terminals are rigidly moulded into the base of the box.

All the standardised accessories are being sold under the common trade mark "C.R." (cable research) as indicated in the accompanying illustrations.

We are indebted to W. T. Henley's Telegraph Works Co., Ltd., for the above information and illustrations.

Uniform Tariffs.

Summary of a report on uniformity of electricity charges and tariffs drafted by a Committee appointed by the Electricity Commissioners.

FOLLOWING on the representations made to the Electricity Commissioners by the Conference on Electricity Supply in Rural Areas, which they convened, the Commissioners appointed in March, 1929, a committee to make definite proposals whereby a greater measure of uniformity in respect of charges and tariffs could be brought about in the electricity supply industry. It consisted of Mr. A. C. Cramb (chairman) representing the Incorporated Municipal Electrical Association; Mr. H. Bentham, representing the Provincial Electric Supply Association; Mr. J. T. H. Legge, representing the Incorporated Association of Electric Power Companies; Mr. F. W. Purse, representing the London and Home Counties Joint Electricity Authority; Mr. C. G. Stanesby, representing the Conference of Chief Officials of the London Electric Supply Companies; and Lt.-Col. W. A. Vignoles, representing the British Electrical Development Association (Inc.), with Mr. C. E. Allan as secretary. The Committee met 35 times, heard evidence, and had the joint assistance of the principal associations of the industry. The chief recommendations made in its report* are as follows:—

Consumers should receive every encouragement to wire their houses throughout and to install lamps of a size that will provide liberal illumination. The present multiplicity of tariffs should cease, and the large number of variants of the different bases at present in use are strongly deprecated.

The Committee considers that the form of tariff it recommends in the present report should be rigidly adhered to and not be subject to special adjustments. It is emphatically of the opinion that it is to the advantage of all supply authorities and their consumers that a standard multi-part tariff should be offered for general domestic supplies, as neglect to offer such a tariff cannot but seriously prejudice successful development. Supply authorities should explain frankly and clearly to their consumers the necessity for the fixed-charge portion of the multi-part tariff and its application in practice as between one consumer and another, and that it is in the consumer's own interests to adopt the tariff so offered. They should suitably adjust their tariffs so as to ensure that they are adequate to provide a return which, averaged over a period of years, will be sufficient to meet any cost due to the rare occasions when exceptionally cold weather prevails; and that if they do so they need not continue to be apprehensive of the possible effect of cold spells, such as occurred in February, 1929, when the heating load suddenly increased materially.

As, in fact, the minimum quarterly charge is an integral part of the fixed charge of a multi-part tariff, it is only reasonable as a matter of equity between one consumer and another that a minimum quarterly charge should be enforced on consumers on the flat rate. It is not unreasonable for supply authorities to charge quarterly meter rents to domestic consumers on the flat rate. It is expedient, however, in the case of such consumers on a multi-part tariff that meter rents should not be charged as a separate item, but should be included in the fixed-charge portion of the tariff.

The Committee recommends the "size-of-house" tariff for supplies to domestic premises, and also as a *statutory* multi-part tariff for such supplies. It should be offered at the consumer's option as an alternative to the flat rate.

The fixed-charge portion of the multi-part tariff should bear all the standing charges and the secondary or unit charge should be as low as practicable and of the same amount in the case of any multi-part tariff offered for whatever purpose in a particular area of supply.

While the Committee is unable to point to any basis as being wholly without defects of some kind, it has come to the conclusion from the evidence which has been put before it (verbally and otherwise) that there is less objection attaching to a tariff the fixed charge of which is based upon the "size of the house."

For the purposes of this tariff the expression "a private dwelling house" shall include any garage, workshop, or other building (attached or detached) within the curtilege, but shall not include any portion of such premises used for trade purposes, or for the lighting of which the consumer is not responsible, or any detached buildings used solely for storage. The tariff shall consist of (i) an annual "fixed" or "service" charge payable by the consumer in equal weekly, monthly, or quarterly instalments as the supply authority shall decide; and in addition (ii) a charge per unit supplied to the consumer.

The supply authority and the consumer shall enter into an agreement, the essence of which shall be a contract year by year. For the purpose of assessing the "fixed" or "service" charge the supply authority shall ascertain the area (in sq. ft.) of the ground floor of the private dwelling house by taking external measurements thereof; and shall multiply the area so ascertained by the number of floors in the house, due allowance being made for part floors. The fixed charge shall be the charge allotted to the appropriate range of sq. ft. in a scale of such ranges previously prepared by the supply authority. The number of ranges of, and the graduation between the ranges in the scale, together with the appropriate charges for each range, shall be decided by each supply authority for its own area of supply. The additional charge per unit (or "secondary" charge) should be the same in the case of all the tariffs offered in the area of supply of the particular supply authority.

The Committee recommends that (*a*) supply authorities should be urged by the Electricity Commissioners, if only in the interests of uniformity, to seek statutory authority to offer this form of tariff; (*b*) the Commissioners and the Minister of Transport should favourably consider any applications for sanction to that form of tariff; and (*c*) a multi-part tariff in that form should be inserted in all future Bills and Special Orders.

The legal position regarding statutory tariffs and charges and non-statutory tariffs is much involved and should be clarified on a suitable occasion. The existing position as regards non-statutory multi-part tariffs offered under the provisions of Section 33 of the Schedule to the Electric Lighting (Clauses) Act, 1899, calls for revision, as it would undoubtedly appear that the present lack of uniformity in the existing forms of multi-part tariffs is due to the right which the supply authority has assumed by virtue of the provisions of Section 33 of offering any form of tariff it chooses. The Committee also recommends that the scope of the Schedule to the Electricity (Supply) Act, 1922, should be enlarged by including provisions whereby the Minister of Transport on the application of (*a*) 20 or more consumers (*b*) in a case in which the local authority is not itself the undertaker, the local authority, and (*c*) the Joint Electricity Authority (if any) may make an order authorising a multi-part tariff and requiring the supply authority to offer such a tariff as an alternative to the flat rate at the option of the consumer. In all cases in which a statutory multi-part tariff is applicable to a supply undertaking, it should be made *obligatory* on the supply authority to offer such a tariff to consumers as an alternative to the flat rate at the option of the consumer.

The Committee is of the opinion that (i) the supply authority should charge a flat rate for domestic lighting which will secure from short-hour lighting consumers on the flat rate the full amount of revenue required to meet the cost of the electricity supplied and the standing charges incurred in supplying such consumers; and (ii) the alternative flat rate for domestic power uses of electricity should be higher than the unit charge of the optional multi-part tariff. The above opinions apply equally to flat rates for business and office supplies.

The most suitable tariff for business premises (including offices) is a simple tariff based on the number of kilowatts of demand ascertained (at the discretion of the supply authority) either by an indicator or by aggregating the number of watts installed, in each case plus a small secondary or unit charge. The Committee recommends this form for adoption as a *statutory* tariff for business and office premises, coupled with an option to the consumer to be charged by an alternative flat rate per unit for the particular purpose for which the electricity is used.

The methods of charge for *small* industrial power users at present in operation include the following:—So much per unit for an initial number of units consumed per kilowatt or horse power installed, and a lesser (*i.e.*, "secondary") rate per unit for all additional units consumed.

The Committee is of the opinion that, with the reservations as regards supplies for agricultural purposes relating specifically to supplies in rural areas, a tariff on these lines (*i.e.*, combined consumption and installed demand method) is most suitable for application to small industrial power consumers and it recommends its general adoption by supply authorities.† Alternatively, the units at the higher rate could be based on the measured instead of the installed demand; an unqualified flat rate should be avoided if possible.

Tariffs for supplies in rural areas should be so designed as to promote the use of electricity for all purposes *as quickly as possible*, thus reducing the losses usually incurred by the supply authority during the initial period of supply. The Com-

* H.M. Stationery Office, 55-156; price 1s. 6d. net.

† Mr. J. T. H. Legge and Lieut.-Col. W. A. Vignoles do not agree with the recommendation to the exclusion of the block or step method which, in their opinion, is more suitable for this class of consumer.

mittee is of the opinion that, with certain reservations in the case of farms and similar establishments, the multi-part tariffs recommended for (*a*) domestic premises; (*b*) business premises; and (*c*) small industrial power supplies (as distinct from agricultural power) would be equally suitable for application to similar supplies in rural areas as in towns and urban districts.

For supplies (other than for power) to farms and similar establishments the Committee suggests certain adjustments of the method of computing the amount of the fixed charge portion of the "size-of-house" tariff. In the case of small power supplies from low-voltage networks for agricultural purposes the Committee recognises that, although when possible it is preferable to include all power purposes in the same multi-part tariff, the demands for power purposes by individual farms vary so considerably that a separate supply may in some cases have to be metered and charged for on a special tariff. Individual consumers who are given supplies by tapping high-voltage lines must be treated by the supply authority as particular consumers under special agreements.

Special systems of charging (*e.g.*, for street lighting, the "fixed price light" system, &c.) are invariably the subject of special contracts and, as they are not charges for electricity only, the Committee only makes passing reference to them. It has, however, given special attention to the prepayment-meter system, in which case consumers should be informed by the supply authority how much of the charge is for (*i*) electricity supplied, (*ii*) the rental, upkeep, collection and costs incidental to the prepayment meter, and (*iii*) any other items (*e.g.*, wiring supplied by the supply authority). The charge per unit should not exceed the charge per unit to consumers supplied through ordinary meters and any general reduction in the price of electricity should be applied equally to consumers on the prepayment-meter system; while the Committee considers that there is justification for an additional charge in respect of item (*ii*) it is of the opinion that in no case should such additional charge exceed 25 per cent. of the actual flat rate per unit charged for similar supplies through ordinary meters.

Assisted Wiring and the Provision of Appliances.

Summary of the Report of the Electricity Commissioners' Committee.

IN March last year the Electricity Commissioners appointed a Committee "to consider what steps could be taken to ensure that facilities for assisted wiring and for the hire and/or hire-purchase of apparatus are made available, wherever needed, to prospective consumers of electricity in rural and other areas of supply, and to make proposals for a practical financial scheme for the purpose." The personnel of the Committee was as follows:—Mr. J. T. H. Legge, chairman (Incorporated Association of Electric Power Companies), Mr. Ll. B. Atkinson (Cable Makers' Association), Mr. H. Bentham (Provincial Electric Supply Association), Mr. S. E. Britton (Incorporated Municipal Electrical Association), Mr. D. N. Dunlop (British Electrical and Allied Manufacturers' Association), Mr. H. Marryat (Electrical Contractors' Association), and Lt.-Col. W. A. Vignoles, D.S.O. (British Electrical Development Association). Mr. E. W. Dickinson was appointed secretary.

As we stated in our last issue, the Committee's report was published last week for the information of the industry, prior to its consideration by the Commissioners. It is obtainable from the Stationery Office (No. 55-154 Electricity Commission) at 1s. net. Nine meetings were held and the Committee heard expert evidence from Mr. Gibson Jarvie (United Dominions Trust, Ltd.) and Mr. W. P. Gauvain (formerly Director of the New Zealand Government Power Board). It also considered views on the subject from the following financial organisations:—The Equipment Trust Co., Ltd., the Electrical Manufacturers' Finance Co., Ltd., the London Industrial Finance Trust, Ltd., and the Industrial Discount Co., Ltd., and was assisted by statistical and other data supplied by electricity supply undertakings. It is stated at the outset that any recommendations could only prove of limited utility if simultaneously cheap electricity, suitable tariffs and continuous publicity were not arranged. The present position is that company undertakings, with few (if any) exceptions, possess full powers with regard to the installation, hire, hire-purchase and sale of electrical wiring, fittings and apparatus. These powers, with the proviso that the prices charged must not be less than the retail prices, are also possessed by the municipal undertakings since the passing of the 1926 Electricity (Supply) Act. Prior to the Act certain of these undertakings had obtained specific powers in local Acts. The Conference on Electricity Supply in Rural Areas implied that the powers were not being utilised on a sufficiently wide scale and that the cost of wiring, lamps and apparatus generally was too high.

There are about 650 undertakings directly concerned in this matter and replies to a questionnaire issued by the Electricity Commissioners showed that of these 213 had expended funds upon the provision of facilities for assisted wiring only; 304 gave facilities for the hire and hire-purchase of apparatus only; 187 provided facilities for both purposes; and of 614 undertakers actually giving supplies 230 had not incurred any expenditure on either kind of service. In a number of cases the matter was under consideration but no expenditure had been incurred; in the remaining cases the observations of the undertakers fell into four groups:—No demand for facilities; waiting for a lead from other authorised undertakers; the matter was under consideration; and schemes for the provision of facilities were being prepared.

Assisted Wiring.

Wiring, once installed, is a non-realisable asset and therefore requires separate treatment. It was found that of the 213 undertakings which had instituted assisted wiring schemes 163 were municipalities and 50 companies. The average total expenditure of 77 local authorities in areas with populations of over 50,000 was £15,130; that of 86 local authorities in areas of under 50,000 population was £4,820; and the average expenditure of the 50 companies was £4,684, making the "overall" average £8,514 per undertaking. The average expenditure for the year 1928-29 was £1,500.

The Committee considers that success cannot be achieved by waiting for a demand to arise; it depends to a very large extent upon the degree to which the availability of deferred-payment wiring schemes are made known, and it cannot be assumed that there is no demand in a district until it has been proved by an actual canvass. An instance is quoted of the results of a canvass in a district in which no gas was available; 653 calls were made and in 121 cases the householders were probable consumers whether facilities were offered or not, 426 desired a supply but were not willing to bear the cost of installation, while 106 did not desire to take electricity.

The Committee came to the unanimous decision that a system of deferred payment for wiring should be generally available to existing and potential consumers. Without a reliable method of collecting, however, the provision of credit facilities will prove expensive. In small premises a prepayment meter might be installed so designed that a fixed recurring payment is made for the wiring before electricity is available for use. In the case of farms a seasonal charge might be arranged, and in many cases an addition to the monthly or quarterly bills would suffice. The Committee is of the opinion that authorised undertakers should be given statutory powers to discontinue the supply in the case of non-payment for the wiring. The Committee reviewed a number of existing schemes for financing deferred-payment systems and put forward three methods: (i) a financial combination or trust formed expressly for the purpose by the various interests concerned in the electrical industry, operated with a minimum of profit; (ii) a finance company outside the industry to co-operate with the undertakers of the areas concerned; and (iii) a scheme financed by the authorised undertaker, or by a group of undertakers, involving the co-operation of other bodies directly interested in electrical development. The broad conclusion was arrived at that the third method (possibly in combination with a scheme of the second class in circumstances where the undertakers were unable or unwilling to provide the finance) appeared to offer the greatest prospects of a solution of the problem of assisted wiring. The Committee examined a number of schemes falling to some extent into the third category. In the case of one company undertaking the general organisation is in the hands of a "Joint Development Committee," set up under the auspices of the British Electrical Development Association. The Committee consists of representatives of the supply authority, local electrical contractors and manufacturers of wiring equipment. Specifications have been drawn up and prices for the work have been agreed between the authority and the con-

tractors. The latter are issued by the authority with standard agreement forms and are allowed to canvass in their districts and collect the first payment on behalf of the authority. Under such an arrangement the consumer has only one person to deal with—the one who will actually carry out the work. The agreements are subject to the approval of the authority. Full details of the scheme are given in an appendix (A) to the report. A somewhat similar scheme, arranged by a municipal supply authority with local contractors, is outlined and fuller details are given in Appendix B. A summary of the results of these two schemes shows that in the company's area, which covers a large amount of rural territory, 791 installations were carried out in five quarters at an average expenditure of £7 per installation; while in the wholly-urban municipal area 6,075 installations resulted in a period of seven quarters, the average expenditure being about £7.7 per installation.

The Committee suggests three methods for assuring the provision of adequate deferred-payment wiring schemes. Where individual undertakers serve a wide and/or populous area and are able and willing to provide the finance, a Joint Development Committee (such as that referred to above) should be established under the auspices of E.D.A.; Appendix C sets out draft rules for such a committee. Or neighbouring undertakers should combine to form a Joint Development Committee, in which case standard prices for the contractors and uniform terms of repayment should be arranged. In the cases of undertakers operating in somewhat remote areas who are unable or unwilling to finance schemes, it is suggested that a Joint Development Committee should still be formed but should include representatives of a suitable finance organisation. It is considered that under the first and second schemes the contractor should collect the initial payment and that all subsequent payments should be collected by the supply authority by an addition to the periodical account, by an addition of so much per kWh through the ordinary prepayment meter, or by a temporary addition to the fixed or running charge through a two-part tariff prepayment meter. In each case the scheme might be extended to cover other than domestic installations, quotations being prepared by the undertakers or the Joint Committee. Attention is drawn to the inducements given to contractors to canvass their districts, in which they should receive the undertaking's assistance, and to the need for regular publicity for the schemes.

After summing up its conclusions the Committee makes a number of recommendations the effect of which is as follows:—With regard to assisted wiring, the Committee recommends that all electricity undertakers who hitherto have not done so should institute schemes for the provision of installations on a deferred-payment basis and make the availability of these systems known. As to the financing of such schemes the Committee says that this should be carried out in the case of individual undertakers, or groups of adjacent undertakings, by the undertakers themselves, and carried out by an organisation composed of a combination of the interests most closely concerned, namely, the authorised undertaker, or undertakers, the contractors and the British Electrical Development Association (a Joint Development Committee); or in the case of undertakers who are unwilling or unable to finance a scheme, by some existing financial organisation acting in conjunction with the undertakers and contractors through a similar organisation. An endeavour should be made to secure uniformity of practice in the provision of schemes and as to the organisation for dealing with such schemes. The Commissioners should call for information and make a yearly statement of progress of schemes throughout the country. It is recommended that undertakers should be given statutory powers to enable them to discontinue supply when consumers fail to pay instalments due on assisted wiring accounts. The Commissioners' attention is drawn to the position of companies whose tenure is terminating shortly, since it is not clear to what extent purchasing authorities would be obliged to take over unpaid balances on wiring agreements.

The Provision of Apparatus.

Any authorised undertaker can supply apparatus under any of the three following systems:—Cash, deferred payment and hire purchase. The last method, under which the apparatus remains the property of the seller until the last payment is made, appears to the Committee to offer greater promise of cheap credit facilities than an initial sale followed by deferred payments. It has been shown that at the end of 1928-29 less than 50 per cent. of the authorised undertakers had incurred expenditure in the provision of facilities for the supply of apparatus. The Committee is of the opinion that as a means of increasing sales of electricity, the sale on easy terms or the rental of apparatus should form an integral part of the activities of all authorised undertakers and those who have not done so should be urged to put into force the powers which they possess. Attention is drawn to the benefits accruing from increased output and improved load factor. The heavier apparatus, such as cookers, fires, water heaters, &c., should be available both on hire and hire-purchase, but the small-current-consuming appliances should be available on hire-purchase only. Already electrical contractors and retailers, stores and financial organisations have undertaken the supply of electrical appliances under hire-purchase or deferred-payment lines. In one case a combination of manufacturers of electrical apparatus has set up a financial organisation expressly for the purpose of selling their own output in this way; details of this scheme are given in Appendix D. While the Committee considers that facilities for the hire or hire-purchase of apparatus will not be adequate until all authorised undertakers advertise their readiness to provide apparatus of any make on such terms to their consumers, it is not anticipated that any special financial schemes other than those already in existence will be required. A distinct advance would be made, however, if the before-mentioned Joint Development Committees could consolidate the efforts of the undertakers, manufacturers and contractors with a view to securing uniformity of practice. It is necessary to organise periodical demonstrations of apparatus, which in the case of rural areas could be held in the local village hall, in a marquee, on a stand at an agricultural show, or in a travelling caravan. In brief, the recommendations of the Committee are as follows:—That undertakers who have not done so should be urged to offer facilities to their consumers for the hire or hire-purchase of heavy-current-consuming apparatus (cookers, water-heaters, fires, &c.), and the hire-purchase of lighter apparatus. That the organisation of these facilities should be undertaken through the machinery already recommended in connection with assisted-wiring schemes. That existing schemes should be amplified, where necessary, and uniformity of practice obtained. That, as in the case of assisted-wiring schemes, the Commissioners should, in due course, call for a report from undertakers as to the amount of business effected by undertakers directly and also through Joint Development Committees where established. Finally, the attention of the Commissioners is again called to the position of company undertakings which are liable to be purchased in the near future by local authorities.

The four appendices to the report give excellent examples of rules and agreements used in connection with the kind of schemes dealt with by the Committee.

Diesel Users Visit Basingstoke.

Report of a tour of inspection of the municipal electricity station, an electrically-equipped farm, and the Thornycroft works, with a summary of a discussion on the use of Diesel engines for peak-load purposes.

A PARTY of some 50 members and guests of the Diesel Engine Users' Association visited Basingstoke on July 24th, where they were received at the Town Hall by Mr. F. SWARBRICK, A.M.I.Mech.E., A.M.I.E.E., Corporation electrical engineer, and welcomed by the Mayor, Councillor J. W. DALLIMORE, J.P., who stated that, ever since the installation of the first Diesel engine at Basingstoke in 1914, the Corporation had had the greatest confidence in that form of prime mover for the generation of electricity. Basingstoke could claim to be supplying electricity at a lower rate than many other municipalities, and attributed its ability to do so to the high efficiency of the Diesel engines installed. For the present year the fuel consumption records promised to be better than ever. In addition to adopting Diesel engines, the Electricity Committee had developed the use of electricity in the rural area. Its area of supply was now approximately 134 sq. miles and it included 37 parishes; supplies were available in every street in the town. The charge for domestic purposes was 10 per cent. of the net assessable value of the property, plus ½d. per kWh, and so successful had the undertaking been that it was now in the position of being able to contribute to the relief of rates out of profits the maximum allowed under the Electricity (Supply) Act of 1926. Sanction had recently been obtained for the installation of further Diesel-engine generating plant and a 950-kW set would, it was expected, be ready for service in the autumn.

Mr. J. J. GRIFFIN thanked the Mayor on behalf of the Association for his welcome, after which the discussion reported on the next page took place.

Peak-load Discussion.

Mr. W. H. Skinner (head of the Technical Institute at Messrs. Thornycroft's works), in opening the discussion, said that the failure of the Electricity Commissioners to appreciate the value of Diesel engines for peak-load purposes was astounding. From the Continent, where the heavy-oil engine had been largely adopted for that work, extremely satisfactory reports were coming of the results obtained since that step was first taken some 2½ years ago, and he thought they should proceed on similar lines in this country where the circumstances were suitable, if industry was to be supplied with the cheapest electricity. For instance, at the Thornycroft works at Woolston, Southampton, Diesel plant of 1,200 h.p. had been installed and a saving of £1,500 per annum made, as compared with the price asked by the Corporation Electricity Department. Further Diesel plant was being installed there and it would mean a loss of some 2,000 h.p. to the national scheme on account of price. The charge at Southampton was 1¼d. per kWh, but he had been told that the Diesel plant produced at a cost of 0.78d. per kWh. At the Basingstoke works of Messrs. Thornycroft two Sulzer engines had been running for 11 years practically without repairs; there was also a Mirrless engine which was doing exceedingly well, and he certainly thought the Commissioners should consider that type of plant for peak-load purposes. (It may be added that Messrs. Thornycroft also purchase a large supply of electricity from the Corporation.)

Mr. F. Swarbrick also referred to developments taking place on the Continent and contended that the use of Diesel engines in the same way in this country would materially assist in making the national scheme a success. Their reliability for all duties had been well established; such plant could be erected more quickly than steam plant and, in addition, it formed a valuable reserve of power at times when disturbance took place in the main supply station, or on the e.h.p. lines. There could be no doubt that in districts where the load factor was not too favourable and the price of energy somewhat high, the installation of Diesel-engine sets for peak-load purposes, in conjunction with bulk supply, was fully justified.

Mr. C. O. Milton (borough electrical engineer, Maidenhead) thought that the views expressed (above) would become considerably more general before very long. He hoped that good results would follow the World Power Conference recently held in Germany, because it had there been possible to see some of the large Diesel-engine plant used for that purpose, and their justification was beyond question. He could speak of the value of such plant from practical experience at Maidenhead during the last four years. During that period there had been an agreement with the Metropolitan Electric Supply Co. for bulk supply, Diesel engines being used for the peak, which arrangement had resulted in a saving of £2,000 per annum to the Maidenhead Corporation. He could not understand why the authorities did not recognise the advantage, because such savings re-invested in mains extensions would tend to bring more business for the national scheme. It was not uninteresting to note, added Mr. Milton, that the large undertakings which had to buy in bulk were also using such plant as they were able to do for the peak to the fullest possible extent. He mentioned a matter that had been referred to at the private annual general meeting of the I.M.E.A. at Eastbourne this year in relation to the revision of power companies' bulk-supply contracts with small undertakings and the attempts that were being made under certain interpretations of the Electricity (Supply) Acts to increase the old charges, suggesting that there were likely to be serious complications in connection with undertakings which bought from power companies instead of direct from the Central Board. There was little doubt, continued Mr. Milton, that Maidenhead could have supplied more cheaply had it been allowed to extend its Diesel-engine plant than was the case with the bulk supply now taken; if, as was the implication Maidenhead's station was to be shut down, then there would be a loss to the town of the £2,000 as between using the Diesel engines for peak load and taking a bulk supply.

Major T. Rich said he had seen the largest Diesel engine in Europe, at Hamburg, which had a capacity of 13,500 h.p. and had been running since 1905. It was possible to put that set on load in five minutes and the use of it for peak-load purposes made an enormous difference to the cost of a station of some 80,000-kW capacity. Incidentally both in Hamburg and Berlin electric lighting had been pushed to such an extent that the peaks were getting larger than ever. Again, at the Hemingsdorf station just outside Berlin, which operated in conjunction with a lignite station some 100 miles away, which was owned by a company with an area of 300 by 150 miles, there was an 11,000-h.p. Diesel engine for peak-load purposes which two men normally started in four minutes.

Mr. H. Wilson (Ashford Urban District Council) said the subject boiled itself down to one of £.s.d. If Diesel engines were to be used during the peak-load period only, then engineers could afford to ignore the running cost and deal only with capital cost. Diesel-engine plant could be installed for £12 per kW for use during peak-load periods only and, taking a life of 15 years, the capital charges would only be £1 4s. per kW per annum on a basis of 10 per cent. He doubted whether anybody had yet been quoted so low a price as £1 4s. per kW per annum for bulk supply. The bulk-supply price under the grid scheme would vary according to the geographical position, which was in some ways very unfair, because if Diesel plant were used for peak-load purposes the capital cost of it would not vary with the district, or would do so only very slightly.

Mr. W. A. Tookey said that, whilst at first the grid scheme aimed at the use of selected stations only at as high a load factor as possible, it now appeared that the intention was to run secondary stations also as peak-load stations. Although the latter would not be so economical in running cost as Diesel engines in individual stations, it was clear that Diesels would not be permitted, except in very special circumstances. It seemed to him almost criminal that British makers of large Diesel engines should be thus prevented from showing what they could do.

Mr. A. W. Porter (borough electrical engineer, Worthing) agreed with the figure of £12 per kW mentioned above. He personally had been taking a partial bulk supply for three or four months and, quite apart from the general question of the use of Diesel engines for peak-load purposes, it had interested him to notice how losses had been piled up, and would be piled up all over the country, in the transmission lines. That would mean a colossal amount of money and the importance of it was not appreciated. In the case of the 33,000-V line serving Worthing the standing losses represented 9s. 6½d. per hour and they would be for ever on that line; if worked out for a year it would represent a colossal amount. That was for a 10-mile line only, and if the situation had been visualised by the Central Electricity Board from the start it was possible that Diesel engines for peak-load purposes would have been given a better show than they were now being given. Personally he was inclined to think that eventually an amending Act of Parliament would deal with the matter, but at present unexpected anomalies were arising in the working of the Acts of Parliament governing the grid scheme, and for the moment awkward points were being solved by the authorities in an arbitrary manner. The I.M.E.A. had the matter very seriously in hand; only by co-ordinated action would any change in the present position be brought about.

Power Station Inspection.

A visit was then paid to the Corporation electricity works, in which the most interesting engine at present is a supercharged Diesel engine of 1,200 b.h.p. made by Messrs. Davey Paxman & Co., Ltd., directly coupled to an 11,000-volt, 50-cycle, alternator of a normal continuous rating of 800 kW, made by the G.E.C. The engine is still more or less undergoing tests and has not yet been taken over by the Corporation, but the original difficulty with vibration has been overcome. The engine is of the four-stroke, trunk-piston, vertical type with eight cylinders of 15.5-in. bore and a 20-in. stroke, and runs at a speed of 300 r.p.m. Incorporated in the engine is an exhaust-driven supercharging and scavenging blower supplied by Messrs. Brown, Boveri, Ltd., under licence from the Buchi syndicate. The engine incorporates its makers' patent spring-injection mechanism and eccentric exhaust-valve gear.

The fuel consumption on test at full load was 0.59 lb. of oil per kW-hour when running on the station load and using grade B Anglo-American fuel oil. Overloads have been carried up to 900 kW, including a considerable period at 880 kW. The exhaust at 10 per cent. overload is darker and the consumption is increased. The low consumption at full load mentioned above has been maintained and has had a considerable beneficial effect on the station fuel costs. The lubricating oil consumption is actually lower than that of the unsupercharged engines of the same size. After running approximately 1,000 hours, inspection showed the engine details to be all in excellent condition.

It is the only airless injection engine in the station and has been operated by a staff accustomed only to air-blast engines, but it has presented no difficulty owing to the simplicity and reliability of the fuel system and controls. The fuel pipes are not under pressure and consequently dribble and sooting at the atomiser are eliminated. Due to the arrangement of the spring ram, the fuel pressure does not vary 7 per cent. at any load or engine speed; in fact, the engine can be run dead cold at any speed at which the flywheel will overcome the compression. Moreover, the system is not at all sensitive to changes of fuel and readily adapts itself to fuels of various viscosity; instant adjustment is possible at the moment of injection and the fuel pumps are merely measuring pumps.

Other Visits.

After an interesting tour of the works of Messrs. Thornycroft (where, in addition to inspecting the shops, the party witnessed a demonstration of six-wheeler road vehicles over exceedingly rough ground, approximating to the conditions in many overseas parts of the Empire) the party proceeded to the Home Farm at Steventon and inspected the electrical installation there of Mr. J. Onslow Fane, who purchased the 2,000-acre farm about two years ago and is running it on the most up-to-date lines for general purposes and pedigree live stock.

Electricity is supplied by the Basingstoke Corporation as part of its rural-electrification scheme by means of overhead lines and is used on the farm for pumping water from an artesian well, for milking cows, cutting cattle food, separating cream from milk, &c., and, of course, for lighting the domestic premises, all the sheds, and cattle accommodation.

Subsequently the visitors were entertained by the Mayor and Corporation to tea at Goldings Park, a large open space which was purchased by subscription by the people of Basingstoke as a war memorial.

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this section.

A Novel Battery Charger.

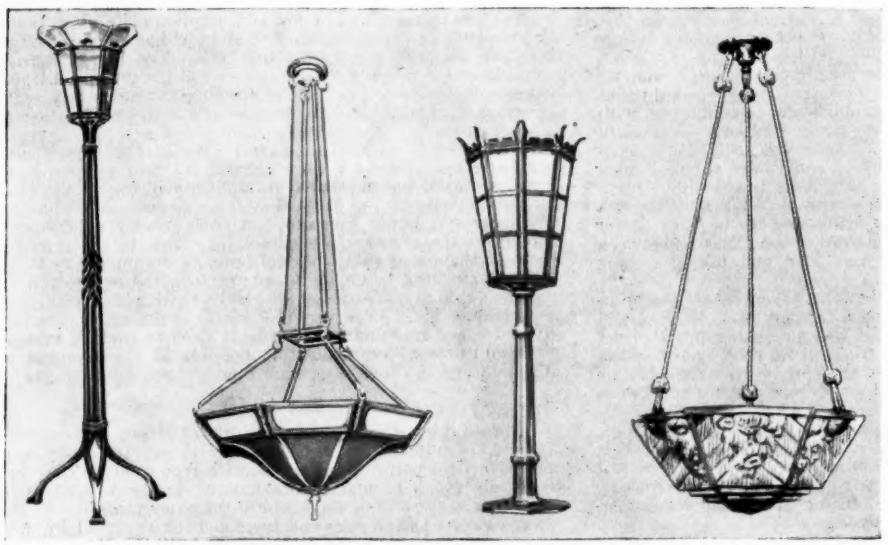
The "Goltone Indispenso" radio battery charger, fig. 1, is a small device recently introduced by Messrs. Ward and Goldstone, Ltd., Frederick Road, Pendleton, Manchester, for enabling radio accumulators to be charged from automobile dynamos. The standard model is equipped with a polarity indicator, a lampholder, a lamp which fixes the charging rate, the necessary leads, and a 2-pin plug for connection with the usual attachment found on the dashboards of most English, American, and Continental cars. Where there is no plugging-in

Fig. 1.—"Goltone Indispenso" Accumulator Charger.

attachment, model MR/2 serves to fill the gap by virtue of two snap-grip fittings for connection directly to the terminals of the starting accumulator. Lamps can be supplied for 1- and 2-A charging rates for both 12- and 6-V cars.

Artistic Lighting Fittings.

From a recently issued catalogue of lighting fittings by Messrs. Falk, Stadelmann & Co., Ltd., 83-93, Farringdon Road, E.C.1, we have selected those illustrated herewith, figs. 2 to 5, as giving some idea of the range. Fig. 2 shows a floor standard with the iron-work treated according to the French school and introduced at the time of the last Paris Exhibition. The second illustration, fig 3, is of a unit designed for domestic



Figs. 2 to 5.—New "Falk Stadelmann" Lighting Fittings.

lighting, and whilst it is treated artistically and finished in first-class style, it is claimed to be moderate in price. Fig. 4 portrays a lantern of Tudor style made of cast and forged iron and glazed with a special type of rimpled English glass. Fig. 5 depicts a suspension bowl fitting featuring French moulded glass in the finish characteristic of this commodity; this glass appears to be in great favour just now, and to be rapidly superseding the more flamboyant coloured glassware of German origin.

An Indicator Switch Plate.

In introducing the "Everlight" switch plate, Patent Switch & Fuse Indicator Co., 1, Ryan Street, Bradford, claims to have fulfilled a long-felt want of being able to locate a switch readily in a darkened room. The "Ever-

Fig. 6.—"Everlight" Switch Plate.

light" plate, fig. 6, is so constructed, it is claimed, that all that is necessary is to remove the existing switch plate and screw on the new plate to which the "Everlight" is attached. Alternatively the existing switch plate may be punched to take the indicator fitting. The indicator consists of a small gasfilled tube in which a "neon lamp" effect is produced, and the poles of the tube are connected directly across the switch terminals by means of flexible contact plates. The test across the tube contacts is claimed to show infinity on a 500-V megger. The tube is carried in an insulating bushing which fits into a suitable punching in the plate, the bushing containing the necessary "window" through which the glow can be seen. The "Everlight" can also be adapted to fuse boxes, &c., for indicating blown fuses, by employing fuse holders equipped with the attachment. The apparatus is only suitable for a.c. circuits.

Non-corrodible Metal.

We have received from Messrs. Charles Clifford and Son, Ltd., Fazeley Street Mills, Birmingham, a copy of their recently published "Al-dur-bra" brochure which should be of considerable interest to all who have anything to do with condensers and to those seeking a metal, in place of brass, which will resist corrosion. "Al-dur-bra" can be briefly described as an aluminium brass of a definite composition of 76 per cent. copper, 22 per cent. zinc, and 2 per cent. aluminium, cast on the "Durville" principle and manufactured under licence of patent No. 308647. The brochure contains technical and scientific data, and also diagrams and illustrations relating to the performance of "Al-dur-bra" tubes, as compared with tubes of the "70/30" type. Messrs. Charles Clifford would be pleased to send copies to readers on request, and would welcome technical discussion on the subject.

Reviews.

"Unsolved Problems: National and International." By John S. Hecht, F.R.Econ.S. Pp. 288. Jarrold Publishers (London), Ltd. Price 16s. net.

Mr. Hecht aroused considerable attention with his book "The Real Wealth of Nations." In this new work he proposes means by which England may emerge from the existing Slough of Despond. The book falls naturally into the two parts suggested by the title. National problems are viewed as being all related to the question of wages. The opening chapter traces the origin and growth of the current theory of wages, which, as stated in the second chapter is, in effect, the view that labour is a commodity, that it has a natural and a market price, and that the payment made for it, like the payment for other commodities, tends in the long run to be equal to its value. The effects of the acceptance of this theory are dealt with. The author maintains that the "wages problem" is due to the uniformity of wages without regard to the situation of the individual as regards dependents and this leads to the discussion of the matter of family allowances. In the fourth chapter the question of "economic liberty" is treated and the conclusion is arrived at that unbridled production by competitive methods is not of ultimate advantage to the community, and that co-operation, involving the curbing of economic liberty, has become necessary. The "law" of supply and demand is next dealt with and it is shown how that law has been responsible for unemployment, trade crises, restriction of output and low wages. This leads to an endeavour to formulate a system of measuring the value of a man's production whereby his wages can be made to bear some relation, not only to the needs of himself and his family, but also to the character of his work. Money as a vehicle of exchange is then studied and the author combats the accepted tenet that deflation and inflation of currency are respectively the cause and cure of unemployment; indeed, he maintains that both are an indirect cause of unemployment and social injustice and that neither is prevented by adherence to a gold standard. Consequently it is proposed that the currency unit should be that sum which will purchase a definite quantity of the commodities which comprise the average daily needs of an average family. Chapter VII takes the form of an *exposé* of the inadequacy of all alternative solutions of the wages problem, while the following chapter is devoted to a survey of the anticipated results of the adoption of the author's proposals. It is suggested that profit-sharing is the only means of securing a just distribution of wealth and that this postulates compulsory rationalisation, with State intervention, as a desirable alternative to nationalisation.

The sub-title of the second or "International" part of the book is "a solution of the safeguarding problem and the abatement of international discord." As in the first part, the opening chapter is a survey of the origin and development of a current theory—this time of international trade. The author traces the rise and dominance of the free-trade or "Manchester" principle in this country and shows the very different effects upon wages and productive costs of competitive and complementary imports. He purports to show that free trade has reduced wages in this country and that universal free trade would lead to the disorganisation of all nations' industries by unbridled competition and to lower wages all round. Mr. Hecht then deals with what he claims to be a number of fallacies underlying the current theory of international trade. The effects of unbalanced exchanges are studied and it is shown that the establishment of true and stable exchange rates necessitates the stabilisation of prices and control of the issue of currency, both at home and abroad, requiring a new international money standard. The author's new theory of international trade involves the reservation of the home market to the home producer; this, he claims, would provide the latter with funds to improve his standard of production and make him better able to compete in foreign markets. It would also provide a solution of all our social problems and tend to the preservation of world peace. Mr. Hecht insists that nationality must continue and that the British Empire, as a self-supporting unit, would promote world peace.

Throughout the work bears evidence of deep research into economic affairs. It can be recommended to the student as an able summary of economic theories and to the more experienced as an original treatment of matters of vital importance to England and to the world.

Definitions and Formulæ for Students. By F. Peake Sexton. Pp. 26. London: Sir Isaac Pitman & Sons, Ltd. Price 6d. net.

There is some inconsistency in the planning of this little book. The title page would lead one to suppose that the book is intended to benefit students of electricial installation work, whereas the preface states that the aim is to provide all that an installation engineer or wireman will require for his daily work, excepting prices and the I.E.E. and Home Office Regulations. Ambition has o'er leaped itself.

The first section is devoted to definitions, but we can imagine very few cases in which they are likely to be of any practical utility. Moreover, the section is not self-contained. Thus "gauss" is defined as "the c.g.s. electromagnetic unit of flux density. It equals one maxwell per sq. cm." This is, of course, a correct statement and follows closely the definition given in the British standard glossary, but there is nothing in the section to inform the reader what a c.g.s. electromagnetic unit, or flux density, or a maxwell may mean.

Section II, on the other hand, gives information which the type of reader envisaged would no doubt find quite useful. The diameters, areas, resistances, and weights corresponding to the various conductors of the s.w.g. sizes and the comparison between the old and new standard sizes are provided in a handy form, while other tables adequately present other relevant information. With regard to the fuse table, we think that, having regard to the elementary knowledge possessed by some readers the author has in mind, an indication might have been given of the effect on the magnitude of the fusing current of using more than one strand of wide. Under the heading "Heating Effects" we are informed that 1,000 cu. ft. of coal gas is equivalent to 16,050 B.th.u., but we do not remember having found any gas to be quite so "lean." One pound of steam coal is stated, without qualification, to be equivalent to 15,000 B.th.u.—a figure that can only rarely be obtained in commercial usage. Under the heading "Alternating-current Notes" there is only the formula for Ohm's law as related to a.c. working. In our opinion the author has tried to appeal to too many kinds of electrical men in the few pages at his disposal.

Legal.

The Fencing of Electrical Apparatus.

On July 30th a Divisional Court of the King's Bench, consisting of the Lord Chief Justice and Justices Avory and Talbot, heard an appeal by an inspector under the Factory and Workshops Acts against the refusal of the Chesterfield Justices to convict the Chesterfield Corporation of the offence of not adequately fencing certain electrical apparatus at its Walton outdoor sub-station.

The Attorney-General said that George Shelley, a workman, was engaged at the sub-station when he fell and came into contact with a 33,000-V bus-bar, being instantly killed. There was no doubt that the place was a factory coming within the provisions of the Acts. Although the man rendered some of the switches dead he failed to cut off the power from the bus-bar that was nearest him while he was at work. In any case, employers could not assume that workmen were always going to be meticulously careful, or would never fall, and must take steps to see that workmen were not placed in danger.

The Chesterfield Justices, however, had declined to convict, apparently on the ground that they thought the work could have been done without danger or because of the fallacy that as the factory inspector did not call expert evidence they need not convict. Further, they declined to state a case for an appeal, saying that it was a frivolous application. He (the Attorney-General) failed to see how any application could be less frivolous. The Corporation submitted that the deceased could have completed the work without danger, and that the accident could not reasonably have been anticipated. Such a defence was not in his opinion sufficient. There was a duty on factory owners completely to protect the workman even if he was negligent or careless, and it was time that justices all over the country appreciated that the Act must be strictly observed. In this case the Corporation should have seen that the whole switchboard was rendered "dead."

Mr. Whinney, for the Corporation, said that the live bar was 4 ft. 6 in. away from the spot where Shelley was standing, and the chance of a workman falling and touching it was remote. The Corporation considered that it had taken every reasonable precaution.

The Court allowed the appeal and ordered that the Justices should register a conviction.

The Lord Chief Justice said that with regard to electrical switchboards the Act was imperative and clear. It said that switchboards or conductors should be rendered "dead" when work was being carried out in connection with them, or that the workman should be so protected as to obviate all danger. It was unfortunate that decided cases on this matter were not cited to the justices for their guidance. If that had been done, they would probably have convicted.

Release from Prison Refused.

An application was made to Mr. Justice Luxmoore in the Chancery Division on July 31st for an order for the release from prison of Arthur Hickson Gower, of Shepherd's Bush, W., who was committed for contempt of Court in disobeying an injunction restraining him from infringing electric lamp patents belonging to the British Thomson-Houston Co., Ltd.

Mr. Roger Turnbull, for the applicant, said that his client had been in prison since July 18th, and had now sworn an affidavit expressing his regret and apologising.

Mr. Trevor Watson, K.C., for the British Thomson-Houston Co., said they did not wish to be vindictive, but they strenuously opposed the application. This man had been carrying on a very extensive clandestine business.

His Lordship said the case belonged to Mr. Justice Farwell, who, however, was not in the building. He should refuse the application, leaving it to be renewed at such time as the applicant might be advised.

Parliamentary News.

[By our Special Parliamentary Reporter.]

The Allocation of Wave-lengths.

On July 29th Mr. Day asked the Postmaster-General whether any steps had been taken for the purpose of arriving at international regulations with reference to wave-lengths.

Mr. Lees-Smith said that the International Radio-telegraph Regulations, which were drawn up at a conference at Washington in 1927, contained provisions for the allocation of wave-lengths among the various types of services. Those Regulations would remain in force until 1932, when they were due to be reconsidered and brought up to date at a conference to be held at Madrid.

Telephone Calls to Australia.

On July 29th Mr. Lees-Smith informed Mr. Welleck that the average weekly number of wireless-telephone calls to or from Australia since the opening of the service about twelve weeks ago was 47. The number fluctuated considerably from week to week, but the general level of traffic was considered satisfactory for a new service.

Aviators and Overhead Cables.

On July 30th Capt. Balfour asked the Under-Secretary of State for Air if, in view of the increasing danger to occupants of aircraft from the high-power overhead cable system now being erected throughout the country, he would consider the setting up of a committee with representatives of the Air Ministry, the Electricity Commission, and the Guild of Air Pilots to inquire into the best methods of minimising this danger.

Mr. Montague said that administrative arrangements already existed whereby all proposals for the erection of high-power overhead cables were referred by the Electricity Commissioners to the Air Ministry for consideration from the point of view of their effect upon the safety of aircraft. These arrangements worked satisfactorily and the Secretary for Air did not think that any further advantage would be secured by the appointment of a committee.

London Electricity Charges.

On July 30th Mr. Day asked the Minister of Transport whether there was any immediate prospect of the introduction of uniformity of prices of electricity in the London area; if he could say when this matter was last considered by the London and Home Counties Joint Electricity Authority; and if he could give particulars.

Mr. Morrison said that the answer to the first part of the question was in the negative. He understood that an investigation of the position in the London area had been made by the Joint Authority, but that before coming to conclusions, the Authority had been awaiting the issue of the report of the committee appointed by the Electricity Commissioners to consider the general question of uniformity of electricity charges and tariffs. The report had just been put on sale by the Stationery Office and the Joint Authority would no doubt proceed to complete its investigations.

Chiswick Electricity Charges.

On July 30th Mr. Muggeridge asked the Minister of Transport whether he could give comparative figures showing the development which had taken place in the undertaking of the Chiswick Electricity Supply Corporation during the last five years, and the development in similar undertakings under municipal control, together with the prices charged in each case.

Mr. Morrison said that it was not possible to find an undertaking which was exactly similar in all points to that of the Chiswick company, but he had caused a comparison to be made with the area under the control of the Beckenham Urban District Council, which afforded a reasonably close comparison. It was found that the amount of energy sold in Chiswick during the past seven years had increased by 94 per cent., while the increase in Beckenham had been 242 per cent. During that period the average revenue per kWh sold had fallen by 0.57d. to 4.57d. in the case of Chiswick, and by 3.10d. to 2.63d. in Beckenham. For lighting and domestic supplies only the average revenue per kWh sold had decreased by 1.68d. to 6.01d. in the case of Chiswick, and by 6.13d. to 3.01d. in the case of Beckenham.

Electricity Supply in Kent.

On July 30th Mr. Mills asked the Minister of Transport whether any application had been made by any local authority for powers to supply electricity to the areas of Crayford, Barnehurst, and Swanscombe, Kent.

Mr. Morrison said that no such application had been made to the Electricity Commissioners in respect of Crayford and Barnehurst. Those places were in the area of the West Kent Electric Co., Ltd., and were being supplied by that company. With regard to Swanscombe, which was in the authorised area of the Kent Power Co., this was included in an application made to the Commissioners by the Corporation of Gravesend in May, 1925. He understood that at a local inquiry into the application the power company gave evidence that it had already carried out extensive works and laid distributing mains in Swanscombe and that the Commissioners eventually refused the application of the Corporation.

Special Orders.

Special Orders have been approved in respect of part of the rural district of Darlington, in the county of Durham; the urban districts of Standish with Langtree and Upholland, and part of the rural district of Wigan, in the county palatine of Lancaster; the rural district of Newent, in the county of Gloucester; parts of the rural districts of Alton and Petersfield, in the county of Southampton, parts of the rural districts of Guildford and Hambledon, in the county of Surrey, and the rural district of Petworth and parts of the rural districts of Horsham, Midhurst, Thakeham, and Westhampnett, in the administrative county of West Sussex; and parts of the rural districts of Steyning, West Horsham, and Thakeham, in the administrative county of West Sussex.

Electricity in the Highlands.

On July 31st, Sir A. Sinclair asked the Minister of Transport whether he was yet in a position to announce the results of the preliminary engineering survey of the Highlands and other rural areas of Scotland by the Electricity Commissioners; and whether the scheme for extending the main transmission lines in those areas had yet been framed or was now in course of preparation.

Mr. Morrison said that as the outcome of the survey, a scheme under the Act of 1926 was now in course of preparation for Southern Scotland, and the Electricity Commissioners hoped to transmit it to the Central Electricity Board in the early part of the autumn. With regard to Northern Scotland, further investigations were still in progress and the Commissioners had not yet come to a conclusion whether a scheme under the Act of 1926 for extending the main transmission lines into Northern Scotland would be eminently practicable.

Proposed Liverpool Street Tube.

On July 31st, Sir George Hamilton asked the Minister of Transport what progress had been made in his efforts to get a tube built between Liverpool Street Station and Ilford; and what he was doing to deal with the congestion of traffic on this line, which was rapidly becoming worse.

Mr. Morrison said he was informed by the London and North-Eastern Railway Company that it was not yet in a position to make any further announcement with reference to this scheme on which it was still awaiting the report of its consulting engineers. He had called the attention of the company to the statement made by the hon. member in the latter part of his question.

The Prorogation.

Parliament was prorogued on August 1st, and, as we stated in our last issue, the new Session will commence on October 28th.

Correspondence.

Correspondents should forward their communications **as early as possible.** *No letter can be published unless we have the writer's name and address in our possession.*

A Meter Problem.

Will any reader assist me with the following query?

When checking the reading of a single-phase lighting meter recently I observed an effect that I cannot account for. At the time of taking the reading a small fan was used as the load. It was noticed that the meter disk, upon completing a revolution, appeared to suddenly increase its speed and then stop; an effect somewhat like an alternator out of step and being pulled in. The meter was then tested with a 15-watt lamp and then with 40- and 60-watt lamps, but with the lamp load the performance of the meter was quite normal, and no stoppage of the disk occurred. Four tests were made at different times with the fan load, and in each instance the meter performed in the manner stated above.

As I cannot myself find a satisfactory solution of this happening, perhaps someone can offer an explanation. The approximate energy consumption of the fan is 50 watts, and the supply is 50 cycles.

J. W. Cooper.

London, N.15, *July 31st*, 1930.

Handy Electrical Appliances.

More communications in reply to the complaint of "Back-to-gas" have been received, pointing out, as did the letters published on p. 162 of our July 25th issue, the suitability of immersion heaters for quick-boiling purposes.—Eds. Elec. Rev.

Published Specifications.

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1929.

535. "Electric switching devices." International General Electric Co., Inc. January 7th, 1928. (303,750.)
877. "Electric ignition devices for internal-combustion engines." C. Odolini. January 10th, 1929. (331,868.)
2,760. "System and apparatus for the electrodynamic operation of railway points, semaphores, and the like." E. Pacilli. January 26th, 1929. (331,891.)
3,731. "Electromagnetic apparatus." J. Feldman. December 20th, 1928. (331,810.)
4,264. "Method and means for measuring electrical potential or current." A. N. Erickson and V. M. Vertucci. February 25th, 1928. (306,818.)
6,993. "Automatic telephone exchange systems." Telefonaktiebolaget L. M. Ericsson. March 6th, 1928. (307,398.)
7,355. "Refrigerating apparatus." Kelvinator Corporation. April 26th, 1928. (310,464.)
7,625. "Supervisory control systems." British Thomson-Houston Co., Ltd. March 8th, 1928. (307,469.)
8,200. "Removal of soot and other solid particles from smoke and fumes." British Thomson-Houston Co., Ltd. March 13th, 1928. (307,805.)
10,042. "Dynamo-electric generators." Forges & Ateliers de Constructions Electriques de Jeumont." March 30th 1928. (308,832.)
10,045. "Thermionic amplifiers." Siemens & Halske Akt. Ges. April 5th, 1928. (309,133.)
10,602. "Electrical purification of gases." F. Bartling. April 5th, 1929. (Convention date not granted.) (309,149.)
10,639. "Electrically-driven rollers for rolling-mills and like purposes." Demag Akt. Ges. July 2nd, 1928. (314,790.)
10,783. "Apparatus for use with telephones and the like." D. S. S. Steuart. April 8th, 1929. (331,829.)
10,788. "Process and apparatus for switching electric currents." M. Paul and P. Wangemann. April 8th, 1929. (331,852.)
10,868. "Speed-control devices for step-by-step electric motors." R. E. Ollerenshaw. April 8th, 1929. (331,834.)
10,869. "Electric switching devices." R. E. Ollerenshaw. April 8th, 1929. (331,835.)
10,929. "Shortening of a sound-record consisting of steel wire." C. Stille. September 26th, 1928. (319,679.)
10,930. "Reproducing magnets for telegraphones." C. Stille. April 9th, 1929. (Convention date not granted.) (319,680.)
10,931. "Electromagnetic recording and reproducing arrangements for acoustic vibrations." C. Stille. September 26th, 1928. (319,681.)
10,933. "Shortening of a sound-record produced on a steel wire." C. Stille. October 20th, 1928. (Addition to 319,679.) (331,858.)
10,935. "Sound-carriers for apparatus for the magnetic recording of acoustic signals in connection with picture films." C. Stille. December 7th. 1928. (331,859.)
10,952. "Thermionic devices." British Thomson-Houston Co., Ltd. April 10th, 1928. (309,447.)
10,995. "Processes for the preparation of organic articles for electrolytically covering them with a metallic layer." I. Ainstein. April 9th, 1929. (Addition to 300,060.) (331,863.)
11,021. "Resonance indicators for wireless transmitters and receivers, and specially applicable for wave meters." J. S. C. Salmond, A. Wilkinson, and A. A. Symonds. April 9th, 1929. (331,865.)
11,078. "Flash and like portable electric lamps." J. H. Runbaken. April 10th, 1929. (331,912.)
11,223. "Manufacture of electrically insulating material." International General Electric Co., Inc. April 11th, 1928. (309,505.)
11,245. "Sound reproducers, particularly telephonic loud-speakers." H. T. Roberts. April 11th, 1929. (331,917.)
11,328. "Inductance coils for use as aperiodic high-frequency transformers." L. Blundell and W. H. Curtis. April 12th, 1929. (331,921.)
11,350. "Snap-action electric switches." K. Schleicher. April 12th, 1929. (331,923.)
11,408. "Process and apparatus for the electrolysis of molten substances." I. G. Farbenindustrie Akt. Ges. April 14th, 1928. (309,605.)
12,161. "Electric water-heating and ventilating apparatus." G. B. Burnside. April 19th, 1929. (331,944.)
12,173. "Production of foundations for poles and the like." Callender's Cable and Construction Co., Ltd., and P. M. Bennett. April 19th, 1929. (331,945.)
12,176. "Electric amplifying or repeating device." Standard Telephones and Cables, Ltd. April 26th 1928. (310,471.)
12,346. "Lamps for automobiles and other vehicles." H. von Stumm. April 21st, 1928. (310,057.)
12,573. "Electric fuses." British Insulated Cables, Ltd., and H. H. Lord. April 23rd, 1929. (331,954.)
12,606. "Absorption refrigerating apparatus." Electrolux, Ltd. May 8th 1928. (331,273.)
13,247. "Electric terminals." Sangamo Electric Co. October 5th. 1928. (331,963.)
13,579. "Insulation of transformers, particularly cross-ring transformers." Siemens & Halske Akt. Ges. May 4th, 1928. (310,968.)
13,615. "Wireless receivers." Gramophone Co., Ltd., and C. E. G. Bailey. May 1st, 1929. (331,969.)
13,735. "Gyroscopic compasses." G. H. F. Berglund. May 2nd, 1929. (331,972.)
14,034. "Resistance grids for electrical purposes." S. A. Hunter. May 6th, 1929. (331,975.)
14,590. "Starting switches for use with electric motors." Midland Electric Manufacturing Co., Ltd., and W. L. Barber. May 10th. 1929. (331,980.)
14,734. "Electric rack striking mechanisms for clocks." M. P. Favre-Bulle. May 11th, 1929. (Convention date not granted.) (331,423.)
14,961. "Automatic operating switch control for burglar-alarm apparatus." H. E. Bayliss, A. C. Woodrow, W. J. Woodrow, and J. W. Woodrow (trading as A. C. Woodrow & Co.). May 14th, 1929. (331,985.)
15,589. "Radio receivers and the like." J. P. Laker. May 18th, 1929. (331,991.)
15,691. "Electric stop-motions for drawing boxes for wool, worsted, and like fibres." W. J. Scott. May 21st, 1929. (331,993.)
15,838. "Intercommunications between telephone systems." Siemens Bros. and Co., Ltd., and A. T. C. Moore. May 22nd, 1929. (331,995.)
15,871. "Means for determining the electric break-through tension of solid substances or of finished insulators." Siemens & Halske Akt. Ges. May 22nd, 1928. (312,241.)
15,944. "Electric contact plug for currents of great amperage." Deltavis Co. May 24th, 1928. (312,322.)
15,972. "Swivel connections for electric cables." C. G. Baker. May 23rd, 1929. (331,997.)
16,209. "Electrically-welded metal tubing." H. F. McLoughlin. May 27th, 1929. (331,998.)
16,308. "Manufacture of photo-electric cells." General Electric Co., Ltd., and N. R. Campbell. May 27th, 1929. (332,002.)
16,951. "Electric generating installations." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). June 1st, 1929. (332,009.)
17,340. "Dynamo-electric machines." General Electric Co., Ltd., R. Orsettich, and M. Kahn. June 6th, 1929. (332,011.)
17,617/8. "Electric furnaces." R. M. Catterson-Smith. June 7th, 1929. (332,015/6.)
18,071. "Mercury-arc rectifiers." British Thomson-Houston Co., Ltd., and F. P. Whitaker. June 12th, 1929. (332,019.)
18,366. "Electric switches." E. Dobson. June 14th, 1929. (332,025.)
19,010. "Electrical resistance devices." H. Pender. June 20th, 1929. (332,034.)
19,096. "Electron-discharge tubes and insulating means therefor." British Thomson-Houston Co., Ltd. June 25th, 1928. (314,341.)
19,130. "Wireless signalling apparatus." Telefunken Ges. für Drahtlose Telegraphie. June 25th, 1928. (314,343.)
19,494. "Keying systems for radio and like valve transmitters." Telefunken Ges. für Drahtlose Telegraphie. June 30th, 1928. (314,535.)
19,641. "Electrical indicator lamps." A. F. Bulgin. June 26th, 1929. (332,040.)
21,256. "Electric switches." General Electric Co., Ltd., C. W. Stopford, and E. C. Walton. July 10th, 1929. (332,054.)
21,461. "Means for starting internal-combustion engines and driving electric generators therefrom." L. Coatalen. July 12th, 1929. (332,055.)
22,819. "Cooling radiators for electric transformer tanks and other uses." St. George's Engineers, Ltd., H. Purslow, and J. Anderson. July 25th, 1929. (332,065.)
23,023. "Thermionic valves." Lissen, Ltd., and J. E. Clark. July 26th, 1929. (332,071.)
23,238. "Radio-receiving apparatus." Kolster-Brandes, Ltd. July 28th, 1928. (316,517.)
23,307. "Electric devices for measuring potential differences." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. August 3rd, 1928. (316,877.)
23,404. "Anodes for electric discharge devices." British Thomson-Houston Co., Ltd. July 30th, 1928. (316,561.)
23,989. "Automatic protective control systems for dynamo-electric machines." British Thomson-Houston Co., Ltd. August 6th, 1928. (316,949.)
25,119. "High-frequency transmitters and receivers." Telefunken Ges. für Drahtlose Telegraphie. September 10th, 1928. (318,860.)
25,489. "Light diffusers for electric incandescent lamps." O. Brunnquell. August 21st, 1929. (332,107.)
27,050. "Electrical measuring instruments." Soc. Française Radio-Electrique. September 27th, 1928. (319,735.)
27,839. "Recording meters." Associated Electrical Industries, Ltd. September 13th, 1928. (318,975.)
28,119. "Clamping devices for steel-aluminium electric conductors." J. W. Hofmann (trading as J. W. Hofmann, a firm). September 16th, 1929. (332,127.)
30,039. "High-tension transformers." Akt. Ges. Brown, Boveri et Cie. October 31st, 1928. (332,138.)
31,915. "Fixing clips for use in surface electrical wiring systems." Edison Swan Electric Co., Ltd., and S. Rogers. October 21st, 1929. (332,151.)
32,391. "Fixing of the depolarising mass to salt-containing carbon elements for electric batteries." A. Kunze. October 24th, 1929. (332,155.)
33,435. "Electric clocks." C. J. V. Fery. November 2nd, 1928. (332,159.)
33,873. "Searchlights for aircraft and other applications." G. A. M. Lamblin-Parent. December 11th, 1928. (332,163.)
34,346. "Electric incandescent lamps." General Electric Co., Ltd. November 13th, 1928. (332,164.)
34,375. "Tubular metal poles for electric power transmission lines, telephone and telegraph work, and like purposes." C. de Witt. November 11th, 1929. (332,166.)
37,750. "Synchronous electromotors." Kienzle Uhrenfabriken Akt. Ges. December 8th, 1928. (332,174.)
38,463. "Spark plugs." A.C. Spark Plug Co. October 10th, 1929. (332,175.)
39,138. "Electric lead-sheathed cables." Siemens-Schuckertwerke Akt. Ges. December 22nd, 1928. (332,177.)
39,736. "Washing machines." Electrolux, Ltd. January 4th, 1929. (332,178.)

1930.

630. "Antenna for wireless signalling." Naamlooze Vennootschap Ingenieurskantoor voor Scheepsbouw, and Svenska Aktiebolaget Tradlos Telegrafi System Telefunken. January 14th, 1929. (332,181.)
1,424. "Railway signalling apparatus." A. C. Stewart. April 12th, 1929. (Divided application on 11,338/29.) (331,929.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from the stated dates:—

July 23rd.

Macintosh. No. 504,891. Class 8. Electric cables. No. 504,892. Class 40. Electric lighting fittings made principally of india-rubber, and wire covered with india-rubber, &c. No. 504,893. Class 50. Wooden conduits for electric lighting and cables.—Macintosh Cable Co., Ltd., 32, Osnaburgh Street, N.W.1.

Columbia High-tension Rapid "B" Battery, &c. (lettering and design). No. 510,072. Class 6. Electric batteries (not for medical purposes).—National Carbon Co., Inc., New York. (British representatives: Marks & Clerk, 57-58, Lincoln's Inn Fields, W.C.1.)

Vocosol. No. 510,141. Class 8. Instruments for use in connection with telephony, radio-telephony and telegraphy, &c.—Vocosol, Ltd., 645, Salisbury House, London Wall, E.C.2.

Lighthouse 6-hours' Battery (lettering and design). No. 511,329. Class 8. Pocket lamp batteries.—Berk & Dundas Fox, Ltd., 86, Manningham Lane, Bradford, Yorks.

Majestic, Voice of the Air (lettering and design). No. 513,139. Class 8. Instruments and apparatus for use in connection with radio-telephony and telegraphy, &c.—Grigsby-Gruner Co., Chicago. (British representative: A. A. Thornton, 7, Essex Street, Strand, W.C.2.)

Vesta. No. 513,351. Class 8. Radio-telegraph and telephone apparatus.—Elektrochemische Fabrik Alfred Baehr Gesellschaft, Berlin. (British representative: D. Grabow, 19, Munster Road, N.W.2.

Ivalek. No. 513,756. All goods in Class 8. J. G. Ivory, trading as the Ivory Electrical Co., 18, Noel Street, W.1.

Tungsraphot. No. 513,419. Class 13. Incandescent electric lamps, lamp-holder adaptors, electric switches and reflectors.—Elektrische Gluhlampenfabrik "Watt" Gesellschaft, Vienna. (British representatives: Marks and Clerk, 57, Lincoln's Inn Fields, W.C.1.)

Herculene. No. 513,388. Class 40. Wire covered with india-rubber.—W. T. Henley's Telegraph Works Co., Ltd., 11, Holborn Viaduct, E.C.1.

Brexine. No. 512,472. Class 50. Insulating parts of electrical apparatus, &c., all made of synthetic resin.—Kolster-Brandes, Ltd., Sidcup, Kent.

July 30th.

Triumphator. No. 511,656. Class 4. Electric arc carbons for cinematograph apparatus.—Siemens Plania Werke Gesellschaft für Kohlenfabrikat, Berlin. (British representatives: Haseltine, Lake & Co., 28, Southampton Buildings, Chancery Lane, W.C.2.)

Vanvac. No. 513,929. Class 6. Vacuum-cleaning machines; and Twinsul. No. 513,930. Class 8. Electric cables.—A. Vandam & Co., Ltd., Caxton House, Tothill Street, S.W.1.

Nedap. No. 513,420. All goods in Class 8.—Naamlooze Vennootschap Nederlandsche Apparatefabriek "Nafa," Amsterdam. (British representatives: Marks & Clerk, 57-58, Lincoln's Inn Fields, W.C.)

Claudigen. No. 513,618. Class 8. Electrically-illuminated signs.—Claude-General Neon Lights, Ltd., Queen's House, Kingsway, W.C.2.

Bermico (lettering and design). No. 510,736. Class 50. Conduits made of vegetable fibre for electrical purposes.—The Brown Co., Portland, Maine, U.S.A. (British representatives: White, Langner, Stevens, Parry & Rollinson, 5-9, Quality Court, Chancery Lane, W.C.2.)

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ARDROSSAN.—Houses (100) for the T.C.; burgh surveyor.
AYR.—Houses (88), Lochside, for the T.C.; burgh surveyor.
BEXLEY.—Houses (166) for the U.D.C.; G. A. Joy, acting surveyor (returnable deposit of £2 2s.).
BIRMINGHAM.—Cinema (2,000 seats), Washwood Heath Road and Arley Road, Saltley; Alfred Ford. Public hall (£11,000); city architect. School for mentally deficient, Hamilton Road (£10,000), for the E.C. Modernisation of Dudley Road Hospital (£15,000); and extension of Bacchus Road Laundry (£11,000); city engineer.
BRAINTREE.—Houses (236), Bocking, for the U.D.C.; surveyor.
BRISTOL.—Houses (1,500), Horfield and Knowle estates; city engineer. School, Hillfields (£14,380); S. C. Taverner & Co., Ltd.
BUCKLEY.—Houses (30) for the U.D.C.; R. Lloyd Roberts, architect, Earl Road, Mold (returnable deposit of £2 2s.).
BURTON-ON-TRENT.—Senior school (760 places) for the borough E.C.; director of education.
CHESTER-LE-STREET.—Cinema (1,500 seats), brewery site, South Burns; A. H. Fennell, architect.
COOKHAM.—Houses (65), Heywood Park, White Waltham; Cripps & Green, Ltd., builders, Maidenhead.
CREWE.—Electric lighting installation, Crewe Green Church; Rev. H. Collins, vicar of St. Michael's.
DUDLEY.—Extensions, Blue Coat School, Bean Road; W. H. Brettell.
GILLINGHAM (Kent).—Bank for Lloyd's Bank, Ltd.; G. E. Clay, architect
GODMANCHESTER.—Houses (32) for the T.C.; borough surveyor.
GUILDFORD.—Houses (30), Shepherds Hill; borough engineer.
HEMEL HEMPSTEAD.—Secondary school (£38,950); N. H. Nowell, Stockton-on-Tees.
HERTS.—Elementary school, Hamper Mill Lane, Watford, for the county E.C.
HITCHIN.—Extensions, boys' grammar school (£32,372); John Willmott & Sons, builders.
HULL.—Underground garage, Dock area (£80,000); also wash-houses, Hessle Road, (£20,000); city engineer.
IRISH FREE STATE (Dublin).—Alterations to Tivoli Theatre for the Irish Press, Ltd.; Thos. J. Cullen, architect, 25, Suffolk Street (returnable deposit of £5 5s.).
(Wicklow).—Alterations and additions to Technical School, Wicklow; H. Painting, architect, Technical School (returnable deposit of £1 1s.).
KENT.—Schools, Herne Bay, Erith, Whitstable, Kingsdown, Stone, Sutton-at-Hone, and Yalding for the E.C.; E. Salter Davies, director of education, Maidstone.
LANCS.—Schools, Leyland (£43,348), Little Hulton (£42,427), and Whiston (£22,445) for the E.C.; education architect. Preston.
LEICESTER.—Nurses' home, City Mental Hospital (£28,000); city engineer. Hostel, &c., Domestic Science College (£12,000); and new infants' school, Hamelon Road (£11,000) for the E.C.
LIVERPOOL.—Alterations to the Palais-de-Luxe Cinema, Lime Street; Gray & Evans, architects, 58, North John Street. Factory for the Lord Roberts Memorial Workshops, in Binns Road, Old Swan; Frank Elgood and Edward Haste, architects, 10, Henrietta Street, London. W.1.
LONDON (Ilford, E.).—Houses (146), Fencepiece estate (£53,536); Wych Elm Estate Co. (Selwood & Co.).
(West Ham, E.).—Fire station (£24,000) for the T.C.; W. L. Jenkins, borough surveyor.
(St. Pancras, N.W.).—Shops and health centre, Camden Road (£21,464); Canonbury Construction Co., Ltd.
(Blackheath, S.E.).—Cinema, Long Lane; Douglas G. Tanner and Arthur Horsburgh, architects, Great Western Buildings, Livery Street, Birmingham.
LONDON.—(*Continued*).
(Lambeth, S.E.).—Improvement, Vauxhall Cross (£617,000), for the L.C.C.
(Southwark, S.E.).—Rebuilding Elephant and Castle Theatre; Gordon Geeves, architect, 10, Hanover Square, W.
(Clapham, S.W.).—Extensions, South London Hospital for Women, South Side; W. Downs, Ltd. Tenements, New Park Road (£115,426), for L.C.C.; C. Miskin and Sons, Ltd., St. Albans.
(Wandsworth, S.W.).—New blocks, St. James' Hospital (£85,000); L.C.C. architect.
(Ealing, W.).—Houses (90); G. Wimpey & Co., Ltd., W.6. Houses (254) for Walton Heath Land Estate Co., Ltd.; R. Costain, architect, 7 and 8, Norfolk Street, W.C.2. Houses (119) at Halsbury Road and Clauson Avenue; C. Pepiatt, 2, Western Avenue, Acton, W.3. Houses (113) and garages (112) for Hongar Hill Garden Estate (Ealing), Ltd.; Douglas Smith & Barley, architects, 50, Queen Anne's Gate.
LUTON.—Factory (£19,524); T. & E. Neville, builders. School (£45,350) for the borough E.C.; Harvey and Webster, builders, Harpenden.
NORTHAMPTON.—School (1,200 places), Kettering Road housing estate, for the borough E.C.; W. R. Kew, clerk. Schools, Weston Favell (£22,996), for the borough E.C.; Co-operative Society, Ltd., builders.
OBAN.—R.C. cathedral; Giles Scott, architect.
OLDBURY.—Council school, Bristnall Lane; F. Brooks, secretary, Education Department, Council Offices (deposit £5 5s.).
PLYMOUTH.—Houses (30) and four blocks of flats, St. Budeaux; city architect. Extensions, Mount Road school (£17,000); Pearn Bros., Ltd.
ROWLEY REGIS.—Senior school for the E.C.; Pritchard, Godwin & Clist, architects, Bank Buildings, Kidderminster (returnable deposit of £2 2s.).
SLOUGH.—Factory, Berwick Avenue; Slough Estates, Ltd. Alterations for Woolworth & Co.; Mr. Priddle, architect, Victory House, Kingsway, W.C.
SMETHWICK.—Secondary school for boys for the E.C. Premises, High Street, for Montague Burton, Ltd.; Brant & Son, Ltd., builders, 65, Whitmore Road, Small Heath. Extensions, Cornwall Road Works; Incandescent Heat Co., Ltd.
SOUTH STONEHAM.—Houses (36), Hound, for the R.D.C.; W. R. Cowell, surveyor.
SPRINGHEAD.—Houses (30), Cooper Street site; surveyor to U.D.C.
SOUTHEND-ON-SEA.—School for the borough E.C.; F. W. Smith, education architect (returnable deposit of £2).
STRETFORD.—Council offices, public library, and wash-house; surveyor to U.D.C.
SWANSEA.—Civic buildings (£350,000); borough engineer.
TUNBRIDGE WELLS.—School for the borough E.C.; J. Bodle, Ltd., builders, Eastbourne.
TWICKENHAM.—Schools and extensions (£37,000) for the borough E.C.; director of education.
WALSALL.—Houses (500) for the T.C.; borough surveyor.
WATFORD.—Houses (90), Eastbury estate; borough engineer. Alterations and additions, cinema, Clarendon Road; T. H. Fligerstone. Extensions, factory, King George Avenue; Irvings Yeast-Vite, Ltd. Extensions, Peace Memorial Hospital, Rickmansworth Road; governors.
WELLINGTON (Salop.).—Houses (50) for the U.D.C.; surveyor.
WEST SUFFOLK.—Schools and extensions (£192,580) for the E.C.; director of education, Bury St. Edmunds.
WOLVERHAMPTON.—Business premises, Queen Street; Henry Gough & Son, contractors, Dudley Road. Completion of Wolverhampton and Staffs. Technical College; H. M. Nowell, Ltd., builders, Stockton-on-Tees.
WORKSOP.—Houses (50), Langold, for the R.D.C.; surveyor.
WORTHING.—Municipal buildings for the T.C.; Charles Cowles-Voysey, architect, 14, Gray's Inn Square, W.C.
YORK.—Houses (50), Acomb Hall estate; city engineer.